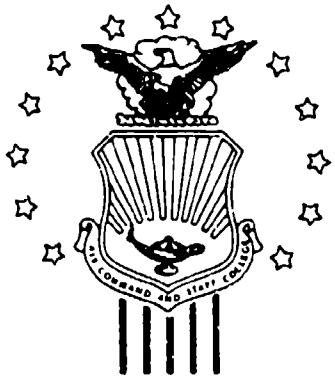

AIR COMMAND AND STAFF COLLEGE

STUDENT REPORT

HISTORY OF
THE KC-10A AIRCRAFT ACQUISITION

MAJOR THOMAS E. HOLUBIK 88-1260

"insights into tomorrow"

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This is an historical review of the KC-10A acquisition. In this program the Air Force bought an "off-the-shelf" McDonnell Douglas DC-10 aircraft, using commercial business contracting practices and procedures for both system acquisition and support, and gave the Air Force Logistics Command a rare opportunity to conduct a major system buy. This review traces the program from 1967 to early 1988 and discusses several lessons learned from its unique aspects. To set the stage, the report reviews the major weapon system acquisition process, both as it was in the early 1970s, when this acquisition program formally started, and in its increased complexity of today. This report should be useful to those concerned with systems acquisition, especially those involved in other commercial derivative programs, and interesting to those curious about the KC-10A program.

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AUTHOR(S) MAJOR THOMAS E. HOLUBIK

FACULTY ADVISOR MAJOR SCOTT C. ALLEN

SPONSOR DR. DAN L. HAULMAN, USAFHRC/RI

Submitted to the faculty in partial fulfillment of requirements for graduation.

AIR COMMAND AND STAFF COLLEGE
AIR UNIVERSITY
MAXWELL AFB, AL 36112-5542

PREFACE

The history of the KC-10A program is a fascinating case study in system acquisition. In this program the Air Force bought an "off-the-shelf" aircraft, made maximum use of commercial business practices and procedures, and provided the Air Force Logistics Command a rare opportunity to conduct a major system buy. The major weapon system acquisition process provides the framework for reviewing the KC-10A acquisition history and many challenges the program faced and overcame in its twenty years as an active acquisition program. Accordingly, this report reviews the weapon system acquisition process, traces the KC-10A acquisition history in considerable detail, and then discusses several lessons learned from its unique aspects.

This project provided the author with a thorough review of the major weapon system acquisition process--as it was in the late-1960s/early-1970s and as it has evolved to 1988. The report should be useful to others involved in systems acquisition and interesting to those who are curious about the KC-10A program.

ABOUT THE AUTHOR

Major Thomas E. Holubik is a professional Air Force officer with over 15 years of highly diversified service. He has been an auditor, cost and management analyst, manager of an Officers Open Mess, contracting officer, and a participant in AFLC's Logistics Career Broadening Program. He has had assignments in the Headquarters of the Alaskan Air Command and Electronic Security Command, the Air Staff, and the Office of the Assistant Secretary of the Air Force (Acquisition). Major Holubik earned an undergraduate degree in mathematics at Baylor University and a masters degree in business administration (operations management) at St. Mary's University of San Antonio, Texas. He has attended the Squadron Officer School, the Air Command and Staff College, and has completed National Defense University's National Security Management Course.

TABLE OF CONTENTS

EXECUTIVE SUMMARY

Part of our College mission is distribution of the students' problem solving products to DOD sponsors and other interested agencies to enhance insight into contemporary, defense related issues. While the College has accepted this product as meeting academic requirements for graduation, the views and opinions expressed or implied are solely those of the author and should not be construed as carrying official sanction.

"insights into tomorrow"

REPORT NUMBER 88-1260

AUTHOR(S) MAJOR THOMAS E. HOLUBIK, USAF

TITLE HISTORY OF THE KC-10A AIRCRAFT ACQUISITION

I. Purpose: Certain aspects of the KC-10A have been addressed in other reports, but a complete history of the acquisition has not been written. Accordingly, this historical review covers the events of this program from inception through production and deployment, and it analyzes the benefits of its unique aspects.

II. Discussion: The history of the KC-10A acquisition is an extraordinary case study in the acquisition of a major weapon system.

A. The KC-10A was originally to supplement the aging and out-of-production, KC-135 tanker fleet; but it evolved into a system with both a refueling role and a strategic mobility cargo airlifting role. The acquisition approach called for buying a readily available, "off-the-shelf," commercial freighter aircraft with lifetime contract logistics support and little research and development or modification effort, and for making maximum use of commercial practices and procedures. Another unusual aspect of this major system acquisition was the placement of procurement authority in AFLC instead of AFSC.

B. The paper first outlines the major system acquisition process as it existed at the time the KC-10A acquisition program started and then describes today's even more complex system. This framework is then used for the historical review, which is given in several chapters. The review begins with the period from 1967 to 1976, a period starting with the identification of the need for an advanced tanker and ending with the release of the Request for Proposal for the Advanced Tanker/Cargo Aircraft. The next chapter discusses the unique role AFLC had in this major system acquisition and continues the history from late-1976 until contract award in 1978. The following chapter describes several particulars of the contract and continues the chronology from contract award in 1978 until 1980 when the McDonnell Douglas Corporation held the "rollout" ceremony and made the first production delivery. The period 1981 to 1988 concentrates on production and deployment activity and ends with a final Program Management Responsibility Transfer to the Oklahoma City Air Logistics Center. The final chapter gives an analysis of several aspects of the acquisition history.

III. Data: This historical account incorporates extensive information found in a number of MAJCOM and unit histories, personal papers, and other documents found in the Air Force Historical Research Center. A number of other related research works were also used in preparing this history.

IV. Recommendation: This paper should be useful to the Air Force Historical Research Center, MAJCOMs, program managers, and others interested in either the KC-10A or a general treatment of our complex major weapon system acquisition system.

CHRONOLOGY OF SIGNIFICANT EVENTS

November 1964	SAC designated single tanker manager for all active USAF units
2 June 1967	SAC issued ROC 9-67, Advanced Capability Tanker, the "KC-X"
October 1967	SAC briefed HQ AFSC and Air Staff on ROC 9-67
22 August 1968	SAC Objectives Plan for 1968-1983 identifies need for an advanced capability tanker
15 December 1973	SAC issued ROC 15-73, "Advanced Multi-Purpose Tanker"
6 March 1974	ASD established Advanced Tanker/Cargo Aircraft (ATCA) Program Office
31 July 1974	ATCA Program Management Directive issued
30 April 1976	SAC issued ammended ROC 15-73
1 August 1976	D&F to negotiate contract approved by SAF
20 Auust 1976	SAC issued ammended ROC 19-73
27 August 1976	Request for Proposal issued to industry
3 September 1976	HQ USAF PMD RQ 5-010-3 transferred acquisition authority for ATCA from AFSC to AFLC
1 October 1976	Effective date of program transfer to AFLC
November 1976	Source Selection Evaluation Board convened
7 November 1976	Technical Proposals received by SSEB
22 November 1976	Contract Proposals received by SSEB
February 1977	FY 78 production funds deleted from budget and Source Selection activities suspended
August 1977	Source Selection activities resumed

19 December 1977	Air Force announced source selection decision and awarded initial fixed price contract to McDonnell Douglas for production engineering, tooling and other non-recurring costs; another contract awarded to Douglas Product Support Division for system logistics support
3 January 1978	Initial contract effective date
3 May 1978	JPO liaison office established at McDonnell Douglas Aircraft Plant
13 November 1978	OSD issued Decision Coordinating Paper approving Milestone III "Production Decision"
November 1978	First production contract awarded for two KC-10A aircraft, non-recurring engineering costs and for initial spares and other support
May 1979	Barksdale AFB, LA, announced as first Main Operating Base (MOB) for the KC-10A
5 November 1979	Second production option awarded for four KC-10A aircraft, additional contract awarded for logistics support, spares and support equipment
16 April 1980	KC-10A official Rollout Ceremony
12 July 1980	First flight of the KC-10A
15 July 1980	Contract awarded American Airlines for training system: five years plus eight annual options
30 October 1980	First aerial refueling by a KC-10A- a C-5A was the receiver aircraft
13 February 1981	Third production option for six KC-10A aircraft and additional logistics support awarded
17 March 1981	First KC-10A delivered to Barksdale AFB, LA
November 1981	Barksdale AFB became first "fully operational" MOB for KC-10A
January 1982	Fourth production option awarded for four KC-10A aircraft and logistics support
1 February 1982	KC-10A program responsibility reassigned to ASD
May 1982	Multiyear contract approval for 44 KC-10A in FY 83 Defense Budget

August 1982	March AFB, CA, activated as second KC-10A MOB
December 1982	Multiyear contract awarded for 44 KC-10A aircraft, bringing total buy to 60 aircraft
October 1985	Seymour Johnson AFB, NC, activated as third KC-10A MOB
October 1987	PMRT of system from ASD to OC-ALC
November 1988	Expected delivery of last (the 60th) KC-10A

Chapter One

INTRODUCTION

The history of the KC-10A weapon system is an extraordinary case study in the acquisition of a major weapon system. Indeed, every major weapon system acquisition is different and tailored to its particular needs, but this program's history spans over twenty years and experienced an unusual and interesting set of circumstances. The KC-10A, known today as the "Extender," was initially intended to supplement the aging, out-of-production, KC-135 tanker fleet; but evolved into a system serving both a refueling role and a strategic mobility cargo carrying role. The system's acquisition approach called for a readily available, "off-the-shelf," commercial freighter aircraft with lifetime contract logistics support, little research and development or modification effort, Federal Aviation Administration (FAA) certification, and the maximum use of commercial practices and procedures. Still, the most unusual aspect of this major weapon system acquisition was the placement of procurement authority in the Air Force Logistics Command (AFLC), instead of the Air Force Systems Command (AFSC).

Some aspects of the KC-10A acquisition have been addressed by other studies and reports, however, the complete history has not been fully documented in a single paper (56:Ch 5; 87:--; 92:--; 97:--). Accordingly, the purpose of this paper is to record the events of this unusual acquisition program in an historical review, from inception through production and deployment, and to analyze the effectiveness or benefits of its unique aspects. To set the stage, chapter two describes the major system acquisition process as it existed during the time the KC-10A acquisition program began and addresses its decision points, formal reviews, and approvals. This chapter also describes today's more complex acquisition system. Next, the acquisition process is used as the framework for the historical review of the KC-10A.

This history is in several segments. Chapter three covers the period of 1967 to August 1976, a period beginning with the Strategic Air Command's (SAC) identification of the need for an advanced tanker aircraft and ending with release of the Request for Proposal (RFP) for the Advanced Tanker/Cargo Aircraft (ATCA). Chapter four discusses the unique role played by AFLC in this major system acquisition and continues the history from late-1976

until the contract award in 1978. Chapter five describes several particulars of the contract and continues the chronology from contract award in 1978 through 1980 when McDonnell Douglas held the "rollout" ceremony and made the first production deliveries. Chapter six covers 1981 to 1988, a period beginning with busy production and deployment activities and ending with Program Management Responsibility Transfer (PMRT) to the Oklahoma City Air Logistics Center (OC-ALC). Chapter seven then provides an analysis of several aspects of the acquisition history.

This paper has been written for a general audience and it therefore has limitations. First, it oversimplifies some of the technical complexity involved in processing a major system buy. This may leave professional acquisition readers unsatisfied on some details. However, the intent of this paper will be achieved if there is adequate detail for both the general audience and the technically-oriented audience to find the KC-10A an interesting case study in our complex acquisition system. Second, this history contains no classified or source selection sensitive data. There is little classified material relating directly to this acquisition program; and while the classified data and source selection data may be interesting, they would not have added appreciably to the report. If this material is needed, it may be found in the Air Force's Historical Research Center at Maxwell AFB, Alabama, or the Source Selection Facility at Wright-Patterson AFB, Ohio, respectively.

Chapter Two

THE MAJOR SYSTEM ACQUISITION PROCESS

BACKGROUND

The acquisition of major systems constitutes one of the most crucial and expensive activities performed to meet our national needs. Accordingly, it is the policy of the Department of Defense (DOD) to make major system acquisitions efficiently and effectively (80:3) while achieving the objectives of the US Armed Forces in support of national policies and objectives. The Defense Major System Acquisition Process has been defined by Office of Management and Budget (OMB) Circular A-109, Major System Acquisitions; implemented by DOD through DOD Directive (DODD) 5000.1, Major and Non-Major System Acquisitions and DOD Instruction (DODI) 5000.2, Defense Acquisition Program Procedures; and further defined for the Air Force by AFSC Pamphlet 800-3, A Guide for Program Management.

The DOD acquisition process is an extremely complex and dynamic process. The complexity is necessary, for this process transforms national defense needs and taxpayer dollars into defense assets. This process has a comprehensive framework of principles, decision points, and milestones, yet is flexible enough to allow for tailoring to any program. Over the years the process has changed considerably while proving to be the constantly evolving management concept it was designed to be; however, its goal, assuring effectiveness and efficiency in acquiring major systems, has not changed. Indeed, the weapon system acquisition process is responsive to the DOD's Planning, Programming, and Budgeting System (PPBS), another dynamic, evolving process. The acquisition system is also responsive in redressing its weaknesses in such areas as cost and schedule controls and field supportability.

This paper does not discuss the entire evolution of the acquisition system, but it does review several key principles and describe its major milestones and decision points. This review covers particulars of the system in the late 1960s/early 1970s when the KC-10A program started, and for comparison, it reviews today's more complex process. This review is essential to understanding the acquisition history of the KC-10A.

Key Acquisition Principles

While the system acquisition process has been influenced and changed by requirements and constraints, certain principles of OMB Circular A-109 and the implementing DOD regulations have been standards throughout the years, and are applicable throughout a system's life cycle. These principles are:

- Need definition based on mission-oriented terms, not equipment-oriented terms
- A strong emphasis on the initial activities of the process to encourage innovation and maximum competitive exploration of alternatives
- Affordability considerations at each decision milestone
- Maximum consideration of interservice and allied standardization and interoperability
- Early consideration of logistics supportability and manpower requirements
- Acquisition strategies tailored to the program
- Minimum acquisition cycle time
- Use of sound business policies and practices
- Achievement of the best cost-effective balance between life cycle cost and system effectiveness
- The early conduct of test and evaluation
- Early planning and integration of computer resources

These principles can be applied to other than "major systems," but they are particularly important to major systems because of the scope and combination of the elements involved.

THE ACQUISITION PROCESS: TWENTY YEARS AGO

The Defense System Acquisition Process is the basic road map for all acquisition programs. Each program has its own unique considerations because of technology, cost, schedule, and management, but the basic framework is the same. During the early life of the KC-10A program, the major system acquisition process started with the formal identification of a need and had four major phases: Conceptual, Validation, Full Scale Development, and Production (91:5-8). While smaller, less complex programs

may have certain phases of this cycle eliminated by agreement of the Office of the Secretary of Defense (OSD), and the Secretary of the Air Force (SAF), the concepts must still be applied (50:1). The formal reviews given at the end of each phase are designed to allow programs to progress to completion or to be terminated on the basis of this standard model. Additionally, milestone decision points allow the Secretary of Defense (SECDEF) monitorship at consistently prescribed points to help reduce the cost, schedule, and technical risks inherent in a new program. The following discussion addresses each phase of the process as an overview of the policies, procedures, and decision points.

Role of OSD in the Major Weapon System Acquisition Process

The most important element in the acquisition system at OSD level in 1970 was the Defense Systems Acquisition Review Council (DSARC), an advisory council to the SECDEF. The Council included the Director of Defense Research and Engineering (DDRE) and the Assistant Secretaries of Defense for Program Analysis and Evaluation (PA&E), Installations and Logistics, the Comptroller, and when appropriate, the Assistant Secretary for Intelligence and Communications. The DSARC was responsible for preparing Decision Coordinating Papers (DCP), which identified objectives, thresholds, conditions and issues like the background or threat involved, in a major acquisition program. DCPs were the official document for the SECDEF's decision at critical stages of the acquisition cycle, defined the Air Force's latitude in managing programs under DSARC review, and documented certain parameters regarding acceptable cost, schedule, and performance. The DSARC generally convened to consider the initiation or continuation of an acquisition program before each of the major phases in the acquisition cycle. During the late 1960s and early 1970's, there were three decision points: DSARC I to enter the Validation Phase; DSARC II to enter the Full Scale Development Phase; and DSARC III for the Production Phase (91:6).

Mission Need Analysis

Mission Need Analysis was an activity of the major commands (MAJCOM) to identify operational deficiencies, obsolescence in existing capabilities, technological breakthrough opportunities, or opportunities to reduce operating and support costs. The weapon system acquisition process began when a statement of need was submitted to the Headquarters (HQ), United States Air Force (USAF). In 1967 this statement was called a Required Operational Capability (ROC). A ROC could originate anywhere in the Air Force, but usually came from the MAJCOM responsible for the mission area the ROC addressed. After review and validation by functional and operational specialists at HQ USAF, the ROC became

the basis for several actions in AFSC, the command charged to develop and acquire new Air Force systems. A validated ROC also triggered certain planning actions within the OSD staff (91:4-5).

Conceptual Phase

The Conceptual Phase began when the need for a new military capability was realized. A concept to provide this capability was formed, and its feasibility studied and tested. To minimize future developmental risk, critical technical and operational issues and logistical support matters were identified for resolution. The Conceptual Phase encompassed research, exploratory and advanced development, and experimental prototypes. After SECDEF approval at the DSARC I point, the program entered the Validation Phase (91:5-7).

Validation Phase

The Validation Phase consisted of verifying the preliminary design and engineering, soliciting and evaluating proposals for engineering development, and selecting the project development contractor(s). During this phase, the objective was to resolve unknowns and validate the ability of U.S. technical and economic bases to satisfy the need before initiating a full-scale weapon system program. Sometimes advanced prototypes would confirm the technology was feasible and the concept had military utility. Hardware or models built during this phase reduced program risk. A positive DSARC II decision closed out the Validation Phase and the acquisition cycle entered Full Scale Development (91:7).

Full Scale Development

During Full Scale Development, the weapon system and support equipment was engineered, fabricated, and tested. A final prototype may have been built to verify final design or producibility. Trade-offs were made between operational requirements, cost, and scheduled operational readiness dates. In this phase AFSC, other MAJCOMs and agencies conducted Development Test and Evaluation (DT&E) or Initial Operational Test and Evaluation (IOT&E). By the end of Full Scale Development, it was hoped all anticipated problems would be resolved, and at this point the SECDEF's DCP for DSARC III for the Production Phase was prepared (91:7-8).

Production Phase

If the SECDEF approved DSARC III, a production contract was negotiated and awarded; and the system, spares, support equip-

ment, training, and facilities, were produced and deployed. The Production Phase also included considerable Follow-On Operational Test and Evaluation (FOT&E) as the system was being introduced into regular operational use. This phase involved the greatest funding levels in a major system acquisition, as the system was deployed, hardware and equipment were distributed to field units, operational units were trained to use the system, and logistical support began to be provided by AFLC. Late in this phase, overall responsibility for the system would usually shift from AFSC to AFLC with a formal PMRT, as production activities tapered off and the logistics functions of maintenance and support increased (91:7-8).

THE ACQUISITION PROCESS: TODAY

This section describes the current acquisition process. The system has evolved and become more complex during the past twenty years. The updated DOD regulations have changed the names of many terms, added new milestone decision points, and require a more thorough coordination process in each phase. Today's DODD 5000.1 and DODI 5000.2 also apply in principle to all acquisition programs, including those not requiring the SECDEF's review or decision authority.

Role of OSD in the Major Weapon System Acquisition Process

Today OSD has greater control of major systems acquisition programs through an expanded formal organization and additional reviews. The Defense Acquisition Executive (DAE) chairs the Defense Acquisition Board (DAB) (formerly the DSARC) and the Vice Chairman of the Joint Chiefs of Staff (JCS) is DAB's Vice Chair. Other members of the DAB include the Assistant SECDEF Comptroller, PA&E, Production & Logistics, Program Operations, the Director, the Service Acquisition Executives of each Service, and the chairmen, as appropriate, of each of ten specialized acquisition committees supporting the DAB. There are now six milestones: "0" for Program Initiation/Mission Need Determination, "I" for a Concept Demonstration/Validation Decision, "II" for a Full-Scale Development Decision, "III" for Full-Rate Production Decision, "IV" for the Logistics Readiness and Support Review, and "V" for the Major Upgrade or System Replacement Decision (49:3-4).

Mission Need Determination

Today Mission Need Analysis is a continuous activity of the MAJCOMs to identify operational deficiencies, obsolescence in existing capabilities, or opportunities to exploit technological breakthroughs or to reduce operating and support costs. A major

command formally identifies this operational need in a document called the Mission Need Statement (MNS). In essence, the MNS is the result of mission area analysis and addresses threat, mission tasks, constraints, alternative concepts, allied capabilities and the impact of not meeting the identified need. The MNS is reviewed by AFSC, AFLC, and other MAJCOMs who recommend possible alternatives to system acquisition, such as modification of existing systems, operational changes in doctrine, or combination of these elements in an attempt to resolve the need. The MNS is then submitted to the SAF. If a major system acquisition is necessary, the DAB Executive Secretary can recommend candidate programs to the DAE for DAB consideration. An approved MNS will receive an Acquisition Decision Memorandum (ADM) documenting the SECDEF milestone decision with goals for cost, schedule, performance, readiness, supportability, exceptions to normal processes, and other directions. This approval, designated Milestone 0, triggers the Concept Exploration or Program Initiation/Mission-Need Decision phase (50:2,5,6).

The Program Initiation/Mission-Need Decision

This phase, also known as the Concept Exploration/Definition Phase, provides formal recognition of the program. Upon DAE approval of this phase, SAF has authority to budget for the new program and enter concept exploration/definition. The primary considerations during this time are mission area analysis, trade-offs in performance/cost/schedule, affordability and life cycle costs (LCC), modifications to a US or Allied military or commercial system to fulfill the need, prototyping, common-use, and cooperative development opportunities. Concept Exploration is an iterative process with many plans and coordination actions to establish the program objectives and milestones. The Program Management Plan (PMP), issued by the System Program Office (SPO) Director, becomes the principal program base line document and will be used by participating agencies and higher level decision authorities. The PMP includes program management requirements (e.g., the approach for assessing technical performance, schedule preparation, reporting requirements, cost data accounting by appropriation, and contracting concepts), test management philosophies, logistics concepts, and security classification guides. Additionally, other objectives can be addressed in the PMP, such as contractor commitments, technical interfaces and approaches, productivity validation, and potential contractors. During this time, the SPO may grow from its initial small cadre to a large management group of functional specialists (engineers, logisticians, cost analysts, contracting officers), who form the hub of the program. The SPO then issues an RFP to the potential contractors. The aim may be to award two or more contracts to encourage competition in the concept, design, approach, and other areas of the program, often including a prototype for the compe-

tition. Preliminary systems designs, technical risk assessments, preliminary cost and schedule, production feasibility and logistics support estimates are generated for those alternatives which fulfill the MNS. These actions support an ADM which will conclude this phase. The ADM is prepared by the SAF for review and approval by the DAB and the DAE. This decision point, designated Milestone I, ends the Concept Exploration and, with a go-ahead decision, marks the start of the Concept Demonstration/Validation phase (50:2).

The Concept Demonstration/Validation Phase

In the Concept Demonstration/Validation Phase, program characteristics regarding performance, cost, and schedule are validated and refined through extensive study, analysis, low-rate initial production (LRIP), or prototype testing. The goal of this phase, to decide to proceed into Full Scale Development (FSD), conduct more tests, or cancel the program, depends in part on the results of these tests. With results in hand, the SAF updates the ADM with inputs from the SPO, AFSC, AFLC, Air Training Command (ATC), and using commands. The DAB reviews the program and updated ADM and recommends a DAE Milestone II decision to reaffirm the need, select a competing systems for FSD, and authorize procurement of long-lead production items. The DAB's main considerations during this phase are LCC estimates, affordability, program risk versus benefit, transition to production, program stability, industrial surge and mobilization capability, and manpower training and safety. Design-to-cost and acquisition streamlining are also emphasized in this phase. The Milestone II review must occur before release of the final RFP for the FSD contract, and the DAB review must precede award of the FSD contract. The DAE's approval of Milestone II initiates the FSD phase (50:2-3).

The Full-Scale Development Phase

During this dynamic phase in the acquisition process, the selected design takes on its final form, production activities line up, and an increasing level of resource commitment is given to the program. Accordingly, the system's design is completed, engineering drawings are finalized, a production prototype is fabricated, support equipment is identified and fabricated, software is developed, and most major problems are resolved through extensive test and evaluation efforts. As the designs and drawings are revised and updated, the designers and engineers from both the contractor's and the Government's teams hold preliminary design reviews and critical design reviews before final agreements on configuration are made. Extensive testing and evaluation is conducted to reduce the program risks, develop confidence in the system design, and resolve problems affecting

cost, schedule, or performance. This testing demonstrates the achievement of program objectives and substantiates a Milestone III production decision. There are two principal types of testing: DT&E, focusing on design and specifications, while verifying proposed changes do not degrade system performance; and Operational Test and Evaluation (OT&E), focusing on system performance, operational effectiveness, logistics supportability, new uses for the system, and tactics to employ the system. The anticipated results of this phase are a preproduction system that closely resembles the final product, favorable test results, documentation essential to the production phase, and most importantly, a decision to enter the Full-Rate Production Phase. This phase concludes with the Milestone III Decision (50:3).

The Full-Rate Production Decision

During this phase, the activities of the contractor and the Government shift into high gear, with larger roles, involvement, and commitment to the system. If the program is significantly large, or has a long time between LRIP and the full-rate production decision, there may be formal program review and Milestone IIIA decision. Key considerations of this phase, in addition to those of earlier phases, are production cost verification, integrated logistics support (ILS) plans, independent assessments of producibility, and multiyear procurement (50:3-4).

Contractor Activities. The contractor produces and delivers hardware, support equipment, data, spares, software, trainers, and facilities. The contractor's main efforts and challenges are in maintaining efficient production and financial management, providing technical and quality control, and making timely deliveries of effective systems (93:13).

Government Activities. As the system and its deliverables enter the Air Force inventory, the Government must verify the hardware's compliance with specifications, develop training programs, deploy, use, maintain, and support the system, and address certain internal management actions. A major internal issue is Program Management Responsibility Transfer (PMRT), which is the formal transfer for the system from AFSC to AFLC and generally indicates the system has begun to experience less emphasis as an acquisition program, per se, and more in the form of maintenance and support programs. Another challenge comes in the budgeting and funding areas, as AFSC's procurement funds decrease and funding for operations and maintenance in the operating commands and AFLC increase (93:13).

Shared Activities. In production, the Government and contractor are concerned with production schedules, quality control, and

contract administration. There will be new problems, challenges, operational shortcomings, subsystem failures, opportunities for new uses, technical breakthroughs, and changes in the threat; and these often generate engineering changes, modifications, and other actions with shared responsibilities (93:13).

Logistics Readiness and Support Review

This review, the Milestone IV decision, focuses on actions or resources needed to ensure operational readiness and support objectives are achieved and maintained during the new system's early life. This review is conducted one or two years after the system's initial deployment. Primary concerns in this review are readiness, sustainability (peacetime and wartime), implementation of ILSPs, and overall logistics capability (49:4).

Major Upgrade or System Replacement Decision

This Milestone V decision review comes five to ten years after initial deployment, focuses on the system's effectiveness, and determines whether major upgrades are needed or if deficiencies warrant consideration for replacement. Other concerns are on the system's continued ability to meet mission requirements, changes in the threat affecting the system's need, changes in technology, and whether the deficiencies call for a major modification or initiation of a new program start (49:3-4).

SUMMARY OF THE ACQUISITION PROCESS

The Defense Acquisition Program is a complex system and has evolved to provide the SECDEF an ever increasing control. During the years since the KC-10A acquisition began, there have been many changes, most notably the addition of new Milestones for a Logistics Readiness and Support Review and a Major Upgrade or System Replacement Decision. There have also been revisions in the name and membership of the DAB and the addition of a DAE on the OSD staff. The system is still tailored to each program due to differences in scope, schedule, risk, need, threat, and technological state of the art; and each program may begin its life cycle in any phases or have certain phases eliminated. Decisions in any phase may continue the phase or cancel the program. In sum, twenty years ago, the Defense Acquisition Program elevated information on system acquisitions to the SECDEF to reduce the risk involved and ensure the program was (still) a good investment for an ever-increasing commitment of resources for the program; and although today's system is more complex, its purpose is the same.

Chapter Three

START OF THE KC-10A PROGRAM: INCEPTION THROUGH RELEASE OF THE RFP

OVERVIEW

This chapter traces the history of the KC-10A program from its inception in 1967 through the release of the RFP nine years later. During this time, the program experienced several stops and starts as the idea for a new aerial refueling tanker matured and arrived at the threshold of joining the Air Force inventory.

1967-1969: IDENTIFICATION OF THE NEED

The KC-10A program can be traced to 2 June 1967, when operational planners in the Strategic Air Command (SAC) first documented the need for an "Advanced Capability Tanker" in a ROC and submitted the ROC to HQ USAF (57:9). As SAC was Air Force's designated single manager for aerial refueling operations (2:17; 4:28), their ROC submission was appropriate. After the ROC generated a number of questions SAC sent representatives to Washington in October 1967 to brief members of the Air Staff and HQ AFSC (57:9). In the ROC and the briefings, SAC described the need in mission-oriented terms as a replacement or supplement for the KC-135, which had gone out of production in December 1964 and was "wearing out faster than was predicted." An advanced tanker would also respond to the growing refueling needs in SAC and the Tactical Air Command (TAC). The two commands felt that without additional aerial refueling capability, bombers could not complete their long-range deep-penetration missions and TAC fighters could not "hop the oceans to police local flare-ups such as in the Middle East or Korea" (3:44).

The idea for the new tanker was well received and quickly gained momentum. On 6 November 1967 Lieutenant General Glen W. Martin, HQ USAF's Deputy Chief of Staff for Plans and Operations, wrote to HQ SAC about the proposed aircraft, now referred to as the "KC-X," and he noted that it related closely to one of the Air Force's objectives for the future in a soon-to-be-released paper (35:1). On 14 December 1967, the Air Staff issued a Requirements Action Directive for AFSC to perform studies to identify alternate approaches for the KC-X (58:191); and in

February 1968, AFSC's Aeronautical Systems Division (ASD) awarded contracts for studies with a two-phased analysis. These studies were to first consider the use of "existing production transports--the Boeing 707-320 and 747B and [the] Lockheed C-5A [and] second, a new aircraft designed specifically for the SAC/TAC tanker missions" (3:45). The studies were to be completed by May 1968; with the results to be used to expand SAC's mission analysis and ROC, and form the basis for a Concept Formulation Package (57:10). This package would then be used to help substantiate actions to reserve funds in the Air Force's budget and obtain approval for contract definition of the system (57:10).

Meanwhile, SAC publicized and created additional interest in the new tanker idea by adding it to its fifteen-year forecast, "Objectives Plan, 1968-1983," which was periodically published to define, in hardware terms, SAC's requirements to be "responsive to U.S. National Policy and Military Strategy," and emphasized the "development, procurement, and deployment of new generations of. . . strategic systems capable of. . . global range" (45:7-8).

As the ROC was being evaluated, Air Force leaders began an advocacy campaign for a new tanker. In his Posture Statement for Fiscal Year (FY) 70, General John P. McConnell, the Air Force's Chief of Staff, told the Senate and House of Representatives on 9 January 1969 that the Air Force "was investigating the feasibility of developing an Advanced Capability Tanker" (54:8), and in later hearings before the Senate Armed Services Committee, he emphasized the need for this new tanker (3:45). General Bruce K. Holloway, the Commander of SAC, commented during an interview on the tanker issue, "We don't have enough tankers to maintain the primary mission of SAC with [our] requirements for [sitting on] alert, maintaining a training program and still provid[ing] TAC and other forces with desired tanker support" (3:45). These statements were further reinforced by General William W. Momyer, the Commander of TAC, who predicted that more and more of the US's forces would be stationed inside the continental US (CONUS) in the future, a condition which would complicate TAC's reaction capability because of the increased distances to get to trouble spots. He also foresaw that tanker operations would soon "be as common as the gas station is to the automobile" (3:45). In fact, General Momyer's predictions actually understated the current and growing needs. During 1968 the Air Force was providing "an air-to-air refueling hook-up about every two minutes around the clock, around the world, in almost any kind of weather" (2:12). Furthermore, all aircraft coming into the Air Force inventory since 1969 have been air refuelable as a required design feature (3:45).

1970-1973: MOVING TOWARD THE CONCEPTUAL PHASE

During the period 1970 through 1973, AFSC attempted to complete a Concept Formulation Package as the basis for a DSARC I decision; however, momentum for the advanced capability tanker program bogged down with studies, budgetary constraints, and competition from other higher priority needs. On one hand, studies were a necessary part of the Conceptual Phase process to validate the need; on the other, however, the lack of a clear solution to the ROC, coupled with the other factors, impeded the tanker's advancement in the acquisition process.

The studies looked into various aspects of the refueling need. Analysts at HQ USAF took a big picture approach, including the US's role in the North Atlantic Treaty Organization, and found deterrence of a Warsaw Pact attack could be improved by having an aerial fuel supply for Central Europe--which would be less vulnerable to attack than the existing supply system of ocean tankers, pipelines, and ground storage facilities (52:2). They also described how a "large aerial tanker," specifically a Boeing 747, could deliver great quantities of jet fuel to the European theater (52:2-16). The SAC planners looking at day-to-day refueling commitments, found ever-growing tanker deficiencies under any future force structure (36:189). Operational planners in TAC felt that fighter aircraft activities could be improved with a multiple aircraft refueling method and submitted their own ROC for such capability on the KC-135 and/or other future tanker aircraft (63:216). This resulted in another AFSC/ASD effort, a Multi-Point Air Refueling Study (MARS). The MARS work proved the feasibility of a wing-tip boom or drogue refueling mode, but won no funding for prototype demonstration (64:193; 65:208). Some other studies at ASD and AFSC emphasized various options for modifying existing aircraft (59:114; 60:82; 61:267; 62:234; 63:216; 64:193). However, all of these efforts identified no clear course of action, particularly in light of the austere budgets seen coming after FY 71 and FY 72.

An interesting resolution to the ROC was attempted in 1971 when the Boeing Company provided an unsolicited proposal to sell fifty KC-747 tankers to the Air Force (64:193). This would satisfy the Air Force's refueling needs, and at the same time, solve Boeing's local problem of high unemployment in the Seattle area. Boeing vigorously targeted the proposal at the Air Staff, OMB, and Congressional staffs in a massive marketing effort; however, the austere budget limitations, as well as the relatively low priority being given to the tanker modernization idea, resulted in the initiative being rejected by each office. Boeing did, however, win award of the only hardware-oriented action during the period, the "747 Tanker Demonstrator Program" in 1972 (65:208; 66:218). This was a successful flight test of a Boeing 747 equipped with a dry refueling boom (without plumbing) from

a KC-135 conducted to demonstrate the feasibility of using wide-bodied aircraft as tankers. Both McDonnell Douglas and Lockheed were willing to perform similar tests, but the Air Staff saw no requirement, nor was there any funding available for additional tests at the time (65:208).

Another significant obstacle in the Air Force's ability to create a strong case for action on the advanced tanker during these years was its timing in relation to the B-1 program. Although the new tanker was not needed for supporting the B-1, per se, there was the potential that such a misperception could be made and Congress might see the KC-X as a direct additive cost to that already highly sensitive program (36:189; 5:35).

In spite of these frustrations, the Air Staff did obtain some recognition for the advanced tanker's need and achieved moderate success in getting the program funded in the PPBS and the Five Year Defense Plan (FYDP). By 1972 the program had a low key funding profile of $1 million for FY 75, $9 million for FY 76 and $30 million for FY 77 (66:219). Unfortunately, just as the funding was beginning to solidify, these amounts were reduced to $1 million per year by an OSD Program Decision Memorandum (PDM) in September 1972, and the Air Force's reclama was denied (66:219). Subsequently, on October 1972 the Air Staff directed a new approach, calling for acquisition of a small, but unspecified, number of tankers with an improved aerial refueling technology (a new boom) (66:220). As part of this plan, SAC obtained advocacy support from TAC, MAC, and the Aerospace Defense Command (ADC); and in December the Air Staff requested AFSC's assistance in preparing documentation necessary for a DCP for a Milestone I decision. At the same time, Mr. James E. Williams, Jr., the Assistant Deputy for Engineering in the Office of the Assistant Secretary of the Air Force for Installations and Logistics (I&L) joined the advocacy efforts by elevating an informative briefing on the need for the advanced tanker to his counterpart in OSD/I&L (66:219).

During 1973 the advanced tanker aircraft idea received new direction with an expanded mission. In February the Air Staff began looking into a way to satisfy the requirement for increased refueling capability in combination with a requirement for additional cargo capacity. The result was the "Aerial Refueling Requirements Study" conducted by the ANSER Corporation for an aircraft to perform multi-mission roles of aerial refueling and strategic airlift (67:226). This study recognized the costs of acquiring both a new tanker and a new cargo aircraft "would be prohibitive and Congressionally unacceptable" (5:36-37). Accordingly, the first objective of this study was to determine the mission fuel requirements for various mixes of bombers and tankers supporting the Single Integrated Operations Plan (SIOP) and typical tactical contingency missions. A second objective

was to determine any deficiencies for supporting such missions. The third objective was to assess the capability of several wide-bodied candidate aircraft (Boeing's 747 and KC-135, McDonnell Douglas' DC-10, and Lockheed's L-1011) to perform such missions.

Then came the Arab-Israeli conflict of October 1973. This conflict highlighted the potential benefits and advantages of an advanced tanker/cargo aircraft: rapid worldwide response capability, greater cargo payloads, and decreased overseas support base dependency (82:1). In fact, if Lajes had denied landing rights to the US during this crisis, 26 tanker/cargo aircraft could have done the job of 118 KC-135's (81:22). While this event was generating significant interest with the SECDEF, the SAF, and the Air Force's Chief of Staff, SAC seized the opportunity to update and bolster its ROC as a multi-command, multi-mission document (68:208).

On 15 December 1973, the new ROC, "Advanced Multipurpose Tanker," addressed the current concept of aerial refueling operations for different force structures; the known refueling requirements and issues of SAC, TAC (TAC therefore rescinded its 1969 ROC for Multiple Aerial Refueling.), ADC, and the Military Airlift Command (MAC); and the new strategic airlift requirements (68:208-209). The new ROC also adopted the nomenclature, "Advanced Tanker/Cargo Aircraft" (ATCA), "to reflect more accurately the cargo capabilities of the proposed aircraft" (37:135). Later in December 1973 an even more affirmative action for the program occurred during the budget exercises when OSD added $20 million to the FY 75 Budget Estimate for developing the ATCA (68:209).

1974: THE CONCEPTUAL PHASE

By the start of 1974 it was clear that although there had not been a formal milestone decision, the Conceptual Phase of a major program was under way, and for the next two years the activity in this phase would prove itself to be as highly iterative as the Major System Acquisition Process envisioned it to be.

The key indications of the program's future potential came when the Air Staff directed AFSC to establish an ATCA SPO on 6 March 1974, and two days later, when the HQ USAF Requirements Review Group validated and approved SAC's new ROC for the ATCA (69:191). The SPO was established in ASD's Deputy for Development Planning on 29 April 1974, and Colonel Kenneth H. Bell was named as the Director (6:16). As a "lean and mean" (97:2) organization, the SPO initially had only about fifteen people assigned. Some of their early work was to help develop the program management plan; chair meetings with representatives of SAC, TAC, MAC, ADC, and AFLC to discuss operational employment

and maintenance concepts; and coordinate the Program Management Directive (PMD) for assigning overall responsibility, direction, and guidance for the program (69:192).

Funding issues were also being seriously worked at this time. On 22 March 1974 Air Staff representatives appeared before the Senate Armed Services Committee to defend the $20 million requested in the FY 75 budget. During subsequent Congressional action, however, the final amount authorized was only $2 million. Nonetheless, General David C. Jones, Air Force Chief of Staff, sensed the program looked more favorable in the out years, and advised action officers associated with the program to plan on accelerating the program with increased FY 76 funding (69:192; 70:160).

Then, lightning struck as the SECDEF cancelled the program entirely on 29 July 1974. The PDM zeroing the program stated the proposal appeared to be based on "marginal analysis," and as a combined tanker/cargo aircraft program, had "tended to confuse the issue of increased airlift capability in Congress" (70:161).

The Air Staff, however, felt this was a major misunderstanding which would quickly be resolved. Indeed, on 31 July the Air Staff directed AFSC to proceed with "all necessary program planning for the development and acquisition of an advanced tanker/cargo aircraft based upon a derivative of an existing wide-bodied transport in the 747, DC-10, L-1011, C-5 class" (70:161). A reclama to OSD was also filed, emphasizing the tanker aspect of the ATCA: big "T," little "c" (13:68). OSD reinstated $5 million in the FY 76 budget for studies and asked for an Air Force study on total tanker requirements for both strategic and general purpose forces (70:162). As it turned out, OSD's Assistant Secretary for PA&E had already developed a mathematical model to determine tanker requirements, and had concluded no additional tankers were needed. On 6 November an Air Staff/OSD team tried to resolve the different positions by visiting SAC's Headquarters for a series of briefings on SIOP targeting, refueling tactics, routing, flight profiles, recovery base selection, and bomber force objective functions. The OSD representatives found the briefings informative, but not compelling enough to change their earlier conclusions (70:162).

On 22 November 1974 SECDEF relented and asked the Air Staff to examine the availability of "six or so used 747 aircraft, beginning in FY 76, and operating them in the Air Force inventory to demonstrate the added capability and flexibility such aircraft would provide" (70:164). "Thus the Air Force had the go ahead for ATCA" (39:284). As a base line consideration, SECDEF had little interest in the ATCA for cargo capability, per se, but favored it as a multi-point tanker with a "bonus" of whatever cargo capability the aircraft inherently had. The Air Force found that at the time there were seven used 747-100 passenger

aircraft and three used DC-10 freighter aircraft on the market. As to the cargo carrying capability of the candidate aircraft, the 747 and DC-10 both had "oversize" capacity (able to carry objects larger than a C-141 can carry), while the C-5 had the even larger "outsize" capability. So, as 1974 closed out, the Air Staff directed AFSC to use the ATCA's available FY 75 funds on the development of aerial refueling mission peculiar equipment and related matters. Had additional FY 76 funds been available, the direction would have been to begin competitive concept definition studies and a source selection (70:164-165).

1975: ALTERNATIVE SOLUTIONS TO THE ROC

During 1975 the Air Force remained solidly convinced of the need for and benefits to be obtained with an ATCA program. Unfortunately, OSD and Congress were not convinced of the need or of the best solution, and the program was in turmoil for much of the year. The full Air Force position at this time was based on the premises that the US reduction of overseas bases, coupled with continued instability in the Mid-East and Asia and unsure futures for our Azores and Philippine bases, had raised the importance of aerial refueling for worldwide airlift. There was also the risk that heavy, simultaneous demands by both strategic and general purpose forces could not be met with the existing KC-135 fleet. By acquiring more in-flight refueling capability, the Air Force felt it would significantly improve military responsiveness and the productivity of the existing aircraft fleet in the following several ways: nonstop flights with heavy payloads to virtually any place in the world, improved aircraft recycling with significant fuel savings, decreased closure times, decreased en route landing point requirements for support personnel and equipment, extended aircraft service life because of fewer landings, and the "bonus" of significant cargo capacity (83:1-2). Furthermore, although SAC did not foresee a SIOP commitment for the ATCA, its addition to the KC-135 force, which did have a SIOP role, would enhance KC-135 availability during periods of crisis (38:295).

In the long run, this line of reasoning guided the program to a successful conclusion, but during 1975, none of the options were pinned down long enough to convene a DSARC I meeting. Such a meeting would have brought together the key decision makers in OSD and the Air Staff, and could have gained commitment for the program's scope, direction, timing, and funding. The SPO and the Air Staff eagerly sought to advance the program, and wanted to start full-scale development in FY 76 (70:165). However, a rapid succession of new concept ideas was about to lead into in a fast series of aborted DSARC meetings.

An acquisition plan for the ATCA considered by ASD, AFSC, and the Air Staff in early 1975 called for a DSARC I review on 15 May to make a selection from three options (71:169-170). Option one was for the purchase of a limited number of used wide-bodied transports for modification to an ATCA configuration. In the second option, a derivative of a wide-bodied transport still in production would be selected for accelerated tanker development using maximum concurrence between DT&E and production. The third option was similar to the second, but allowed for a more gradual process of development and acquisition. On 10 April the scheduled DSARC meeting date was moved to 10 June, as General David C. Jones, the Air Force's Chief of Staff, directed the inclusion of an additional option: the lease of a wide-bodied commercial aircraft for an austere prototype operational demonstration. The DSARC meeting date later slipped to 30 June to allow for more extensive revision of the DCP to further strengthen the emphasis on the new lease/prototype alternative and accommodate an extensive DCP coordination cycle (71:173-174).

Meanwhile, General Jones was collecting additional data on the lease/demonstration approach. He found that leased aircraft would, in fact, be far less expensive than a complete development program of a new aircraft or purchase of an old aircraft. Also, a lease/demonstration would forego an extensive and expensive testing program at Edwards AFB. At this time, the only two aircraft types available for lease were McDonnell Douglas' DC-10 and Boeing's 747 (39:284).

In August 1975 General Jones proposed the ATCA demonstration to the SECDEF and won approval. The program was quickly restructured to this commercial derivative program with an operational demonstration (a fly-off) as part of a source selection between two aircraft (a Boeing 747 and a McDonnell Douglas DC-10) leased from the competitors, to emphasize the element of competition (72:161). Both commanders of SAC and MAC enthusiastically supported this program as an objective way to identify "how best to employ, exploit, and evaluate the potential capability of both the cargo and refueling capabilities of such aircraft" (38:295). This program would be followed with a DSARC III Production Decision (97:2). As part of this restructuring, the SECDEF approved $60 million for the effort (83:2). Under this plan, the DSARC I Decision was postponed to 23 September but then later cancelled entirely (72:161).

On 5 December 1975 DOD revised the lease/demonstration program from a two aircraft demonstration to a direct procurement plan (39:285). This would cancel the six-month demonstration and result in a "competitive paper source selection leading to direct procurement of 41 wide-body freighter aircraft." In an interesting twist, both HQ USAF and the SECDEF asked for funding for 40 airplanes, but a computer error provided funding for 41

aircraft, and the figure stuck (39:285). On 23 December, Presidential approval of the budget and the subsequent Program Budget Decision (PBD) to fund the program at $2.9 billion, directed an almost immediate start to buy 41 aircraft in FY 77 (13:69). The directive action granted approval to conduct verification of performance capabilities and the concept of operations for world-wide refueling and airlift support after receipt of the first production aircraft. This decision funded the program with aircraft production funds and eliminated all of the research and development money from the ATCA program except for the refueling subsystems (97:2). So, with the year closing out, the program suddenly bypassed the Validation Phase and Full Scale Development Phase of the system acquisition process, and began to focus on a DSARC III Production Decision. This would give the program a direct procurement based on an intensive source selection, with a contract award in FY 77 and first deliveries in FY 79 (72:163-164).

1976: ISSUANCE OF THE RFP

This section discusses the events of 1976, when the ATCA program was touched by every office typically involved in a major system acquisition, plus AFLC, in an altogether new role. It also includes details about the RFP for the program.

Throughout the year the ATCA received considerable attention from Congress. During the hearings on the upcoming FY 77 budget, the Air Force submitted information on the program's general rationale, its comparison to and trade-offs with the KC-135, its relationship to the B-1 program, its anticipated mission profile and concept of operations, its relationship to other Air Force airlift enhancements, and the notion of acquiring an "off-the-shelf" aircraft (73:145). By the end of June, Congress agreed that there were "some impressive economies associated with an ATCA," because of the refueling and cargo carrying benefits realizable with a "Jumbo Jet" carrier (89:6; 81:21), but it remained uncompelled to fully fund the program. The Air Force Program Objective Memorandum (POM) requested $37 million in FY 77 for engineering, long lead effort, and production planning, as well as $2.6 billion for 41 aircraft during the period of FY 78 through FY 82. However, in September, the Appropriation Bill provided only $28.8 million for FY 77 activities (74:95).

After the postponements of 1975 and early 1976, the DSARC principals finally reviewed the ATCA program on 22 July 1976 in a "Program Review" meeting in lieu of a formal DSARC (74:95). Prior to the meeting, the Air Force submitted information to OSD for preparing a DCP. Also before the meeting, members of the Air Force Board Structure, including the Airlift Panel, the Force Structure Committee, the Program Review Committee, the Air Staff

Board, and the Air Force Council were briefed (73:145-147). As a result of the Program Review, OSD approved the Air Force's release of the RFP and requested a DSARC III Production Review be held before the release of production funding (74:95).

During January 1976, HQ AFSC and the ATCA SPO began preparing new plans in response to Air Staff direction and the OSD PBD that had been issued in December 1975 (85:2). While both plans would eliminate the demonstration plan and adopt the direct procurement approach, the preferred plan called for a buy program starting in FY 77, while the other plan had a year later, FY 78 procurement start. The first approach necessitated releasing the RFP in August 1976, awarding the contract by 30 March 1977 (13:69), and having a DSARC III production decision by 30 April 1977 (85:1). In February the ATCA SPO's Command Assessment Review addressed how it would accomplish the direct procurement approach (73:145). There was also some very specific direction from General Jones to the SPO at this time. He wanted "minimum aircraft testing; justification of every military specification included; a very simple, straightforward RFP; and a contract he could virtually fold up, put in his pocket, and forget about until aircraft delivery" (97:4).

The staff at HQ SAC also had a busy year with the program. In January, SAC revised its 1973 ROC to better reflect the growing requirement for supporting general purpose and airlift aircraft. The final ROC, published on 30 April 1976, had the multicommand endorsement of TAC, MAC, and ADC (73:145). A modest "controversy" arose among the "using" commands on the definition of the "operating" command, but SAC persisted and was reconfirmed as the single manager for aerial refueling (73:145). SAC also participated in the Air Staff's February 1976 conference for ATCA "users" to define the system's concept of operations. The resultant concept paper was coordinated throughout the Air Staff at the Deputy Chief of Staff (DCS) level before submission to the Chief of Staff in June (73:147). Neither the concept of operations nor the ROC justified a fleet size of 41, or any other specific number (13:69). The logistics support plan required maximum contractor support at all levels of maintenance and supply, with no more organic ability than "a blue-suit capability to at least launch, park, and recover the ATCA" (38:296).

During August 1976 the SPO, working closely with the operating commands, completed the key documents needed for the acquisition: the statement of work (SOW), data lists, source selection plans, and the RFP. On 27 May the draft RFP had been given to industry for comments and to foster understanding of the proposed LCC model and the contract's anticipated "latitude for incorporating commercial concepts which would preserve the business and technical advantages inherent in a commercial acquisition" (97:5). The RFP also included six mission profiles developed by

the operating commands to be satisfied by the proposals. Meanwhile, the SPO processed two other essential procurement documents through AFSC, the Air Staff, and the Secretariat (97:5-6). One was the Determination & Findings (D&F) statement from the SAF giving authority to negotiate the contract. The D&F was approved on 11 August 1976. The other was the Advance Procurement Plan (APP) detailing the issues of the procurement approach. The APP, approved on 26 July 1976, contained the following guidelines:

- A competitive procurement with two sources, Boeing and McDonnell Douglas
- All nonrecurring effort to be procured in the first two years, no out-year production cancellation charges
- Firm-Fixed Price contracts, except peculiar modifications
- Air Force would obtain FAA certification on all aircraft modifications
- The winning contractor would, at his facility, conduct and logistically support the first aircraft test
- Maximum use of commercial contracting practices
- Peculiar support equipment and commercial training for the initial crews would be purchased
- Minimum use of Government furnished equipment
- Contracts would be awarded to both contractors if in the Air Force's best interests

The RFP allowed the SPO to make certain strategy decisions based on the proposals (97:5-6). Further, the multi-point refueling subsystem was deleted from the RFP and SOW since the research and development (R&D) costs appeared excessive and the benefits would not justify developing the system (13:69).

On 27 August 1976 the SPO released the RFP for the ATCA. Instead of specifying definitive quantities, the RFP took an incremental approach, requesting price proposals for varying numbers of aircraft, based on the funding profile to be established by the PBD for each FY (13:71). The RFP indicated the contract would be awarded by 30 March 1977 (38:296).

In September, responsibility for the ATCA acquisition program transferred from AFSC/ASD to AFLC's new Air Force Acquisition Logistics Division (AFALD). Chapter 4 of this paper contains a discussion on AFALD's background and mission, the details of this transfer, and the continuing history of the KC-10A.

Chapter Four

THE UNIQUE ROLE OF AFLC AND RFP TO CONTRACT AWARD IN THE KC-10A PROGRAM

OVERVIEW

One of the most significant organizational developments in the Air Force during 1976 was the formation of AFALD by AFLC. To understand why procurement authority of the ATCA program was transferred to AFALD necessitates a review of the background, origin, and mission of this new organization. Accordingly, this chapter reviews AFALD's history and then continues the historical review of the KC-10A acquisition from the time the program transferred to AFALD in 1976 until contract award for the KC-10A in 1978.

HISTORY OF AFALD

The AFALD was established in July 1976 under the command of Lieutenant General Bryce Poe II to strengthen the interface between AFLC and AFSC by providing a direct liaison between the two commands. In this position, AFALD was to insure early integration of logistic support planning in the acquisition programs of ASD, and help reduce the total life cycle cost of weapon systems (7:15). The establishment of AFALD also underscored the increasing emphasis the DOD had been placing on ILS since 1964. At that time, OSD published a DOD Directive 4100.35 on ILS and formalized the requirement for systematic planning and management of logistics resources. OSD expected ILS actions to occur during the development of a weapon system, and to result in the creation of an effective logistics base for the system's operation. The Air Force felt the ILS issue was part of the systems engineering concept it initiated in 1961 when AFSC was created. Furthermore, AFSC felt ILS was accomplished if the system engineers considered logistics requirements during the early life cycle of a system

[Unless otherwise indicated, the information on AFALD's history, pages 25 to 28, was taken from "History of AFLC" for 1976 (20:1-8) and edited by Major Thomas E. Holubik.]

and trade-offs were made between system effectiveness and LCC estimates. However, the efforts given to ILS were usually incomplete and always inconsistent.

To make sure ILS was given better attention, AFSC and AFLC established a Deputy System Program Director for Logistics in major system SPOs in 1969. AFLC logisticians filled these positions, provided technical logistics guidance for the development of the weapon system, and served as the focal point in the SPO for the management of logistics support. In 1972 a new Air Force regulation, "ILS for Systems and Equipment," changed the title of this position to Deputy Program Manager for Logistics (DPML) and placed additional emphasis on the ILS concept by requiring DPMLs to prepare an ILS Plan (ILSP) for each major system. The ILSP was to have detailed plans, tasks, and schedules for each element of logistics in each phase of the development program, but it did not give definitive direction for producing and executing the ILSP as an integral part of the overall acquisition process. With the DPML in the SPO, AFLC felt it had made the intended logistics input into the development and acquisition of the new system.

Problems arose, however, as the role was looked at differently by the two commands. On one hand, AFLC and its Air Logistics Centers saw the DPML as a mere liaison with no real control of policy, procedures, or resources. On the other hand, AFSC's SPO Directors saw the DPML as another "Director." There was also some confusion with communications and reporting channels. When this situation was noticed by the Air Force Audit Agency, the auditors recommended that AFLC resolve the dilemma by establishing a new organization at the DCS level to direct and coordinate all ILSPs. Accordingly, in 1974, AFLC created a DCS/Acquisition Logistics (AL), tasking it with responsibility to administer all ILS matters.

During 1975 an AFLC "Tiger Team," or working group, surveying the HQ AFLC operations, found a great deal of overlap between the new DCS/AL and the DCS/Materiel Management (MM). Some of this overlap was expected since the evolution of a weapon system required it to transfer from the former organization to the latter at some point during either the full-scale development or the production phase of the acquisition cycle. However, in further considering this overlap, the Tiger Team noted that if some of the MM functional offices could be realigned into AL, the union would create a single DCS organization responsible for managing a system throughout its life cycle.

At about this same time, HQ USAF was looking into ways to strengthen the ILS concept, and had established the Systems and Resources Management Action Group (SRMAG) to analyze methods, organizations, and resources employed by the Air Force to acquire

and manage weapon systems. Lieutenant General Joseph R. DuLuca, retired Comptroller of the Air Force, had been called back to active duty to chair the SRMAG. In December 1975 General DuLuca's final report for the SRMAG included a recommendation calling for certain improvements in Air Force procurement, production, and contract administration activities.

Lieutenant General Robert E. Hails, the HQ USAF DCS for Systems & Logistics, had recently looked into similar areas. He felt that General DuLuca's finding and recommendation in this area had only addressed the tip of an iceberg in the acquisition community where "fundamental changes were needed if the Air Force was to achieve more effective control of life cycle costs." General Hails then recommended the establishment of a "new Air Force Systems Acquisition Center (AFSAC) for aeronautical systems" as a part of AFLC. Under his proposal, a new SPO would be co-staffed from inception with personnel from both ASD and AFSAC, with AFSAC responsible for service engineering, logistic matters, procurement, and financial management. As the program matured to the point of having a positive DSARC III production decision, a stable base line configuration, and the award of its initial production contract, PMRT would pass the program to AFSAC alone. Still later, when all production was completed, a final PMRT would pass the program responsibility to AFLC's appropriate ALC.

When General Hails' AFSAC concept was merged with the recommendation from AFLC's Tiger Team, to realign the overlapping ILS functions within AL and MM, the marriage led to formation of AFALD. The idea for this organization circulated quickly and favorably throughout the Air Staff, AFSC, and AFLC. The Air Force Chief of Staff, General David C. Jones and the SAF, Mr. Thomas C. Reed, agreed to the proposal on 6 May 1976, and the activation of AFALD was set for July 1976.

During late May, AFALD's initial and long range phases were approved by General F. Michael Rogers, the Commander of AFLC, his staff, and the AFALD steering committee. General Rogers kept the authority for general policy making for AFALD within the HQ AFLC DCS for Plans & Programs and DCS for Logistics Operations. With this arrangement, HQ AFLC could coordinate with HQ AFSC and the Air Staff on overall acquisition policy issues, while AFALD, in managing acquisition program matters could deal directly at any appropriate organizational level.

The implementation of AFALD was planned to occur in three phases. The first started with the initial planning for the new organization on 28 April 1976, and ran through 31 October 1976. This phase was devoted to initial planning and activation. The second phase would stress the particulars of the AFALD mission. It would overlap the first phase by starting on 1 September 1976 and would run to 30 April 1977. During the third phase, 1 March

1977 to 31 December 1977, AFALD would participate with AFLC, AFSC, and the Air Staff in joint studies of the Air Force's acquisition process. It was felt that the actual method of operations would evolve over time and with experience in working with ASD's product divisions, so AFALD would be allowed to adjust its structure and operations as necessary. Although AFALD was not given the full span of responsibility General Hails originally envisioned, it was given closer technical ties to AFSC's product divisions than any previous AFLC office and the new organization was indeed a revolutionary step for Air Force and DOD acquisition processes.

ASSIGNING THE ATCA PROGRAM TO AFALD

During the planning stages of AFALD, General Jones felt the ATCA program, because of its unique nature, would be an appropriate one for assignment to the new organization. General Hails saw several benefits to such an assignment, since the operational and support costs would be the key to the LCC of this "off-the-shelf" buy (13:69-70). General Rogers agreed, and felt that a PMRT should be made during the first phase of AFALD's development. As the idea developed, several pros and cons were identified with the transfer (13:70). The "pro" considerations included:

- A logistician as chairman of the ATCA Source Selection Advisory Council (SSAC) would help convince the aerospace community the Air Force was serious about giving operating and support considerations and costs the same degree of consideration provided performance and acquisition costs
- Assigning ATCA to AFLC would create a positive pressure environment in AFLC and AFALD to immediately improve their program management capabilities for acquisition programs
- As a "first," the team would be highly success motivated
- Again, as a "first," ASD would give a best effort in its matrix support
- This program would foster greater interdependence and cooperation between AFLC and AFSC
- The program could provide an opportunity to evaluate "cradle to grave management" by a single office for programs of modest developmental complexity
- Transfer to AFALD before source selection started would further help in integrating logistics and support considerations

There were also a number of reservations seen in such an assignment. These "con" aspects included:

- As the candidate ATCA aircraft were already designed and operating, most characteristics were already inherent, and only subsystems were subject to supportability enhancement

- AFLC and AFALD had little program management capability

- Personnel implications, such as the need to transfer personnel now in the ATCA SPO to AFALD

- Since ASD's matrix support would still be required for financial, engineering, and procurement functions, ATCA needs would compete with and complicate ASD priorities

- ATCA could distract AFALD's attention from other programs or opportunities to reduce costs

- Unless ATCA was a precursor to additional AFALD acquisition programs, there would be no long range benefits to AFALD developing program management capability

From his point of view, General Poe, the Commander of the new organization, saw four main issues: AFALD's program management capability, the timing involved in the transfer (after release of the RFP would be best), the opportunities for improving acquisition management, and the relationship and impact this effort would have on the new Division's mission. He also felt that because of a lack of understanding outside the Air Force of this transfer, the PMRT actions needed to be defined well in advance by a team made up of all the involved commands (13:Ex 62).

After considering the pros and cons, the Air Staff approved the transfer. On 27 August 1976, the RFP was released by ASD. On 3 September a PMD designated AFLC the "implementing" command for acquiring "off-the-shelf wide-bodied freighter aircraft, modified only as necessary for air refueling capability," and exploiting "cargo-carrying capabilities commensurate with the inherent design of the existing fuselage structure" (13:71). In forwarding the PMD to AFLC, General Alton D. Slay, Commander of AFSC, acknowledged the unusual nature of the action and noted the change would need "wide latitude to work out the best joint arrangements" (13:Ex 63). The other responsibilities for the ATCA program remained the same: SAC as "operating" command, and TAC, MAC, ADC, AFTEC, and AFSC as "participating" commands. On 1 October 1976, AFALD officially assumed all responsibility for the ATCA program (13:71). Some personnel in the SPO, including the SPO Director, were assigned to AFLC, and in recognition of its composition of AFLC and AFSC personnel, the SPO became known as a "Joint Program Office" (JPO) (97:29).

1976: THE SOURCE SELECTION PROCEEDINGS

The Source Selection Evaluation Board (SSEB) convened at Wright-Patterson AFB, Ohio, and on 8 November 1976 began evaluating the proposals from McDonnell Douglas and Boeing (13:71). The evaluation used the general guidance of AF Regulation 70-15, Source Selection Policy and Procedures, and direction of the Source Selection Plan approved by the SAF on 27 August 1976. At least two contracts would be awarded: one for acquisition of an undetermined number of aircraft, the other for logistics support of the selected aircraft. A classic source selection organization was formed for the evaluation. The SAF or a designated representative was the Source Selection Authority (SSA). The Source Selection Advisory Council (SSAC) was chaired by the Commander of AFALD (the Commander of ASD had been the chairman before the transfer) and comprised of representatives from SAC, TAC, MAC, AFSC, AFLC, ATC, HQ USAF/RD, and the SAF offices of General Counsel and Financial Management. The Source Selection Evaluation Board (SSEB) was chaired by the JPO Director and included personnel from the JPO, representatives of the operational commands, and specialized consultants from the FAA, ATC, and the Air Force Test & Evaluation Center (AFTEC). During the analyses, the SSEB had six functional area panels: operational capability, technical, contract, cost, management, and logistics.

The SSEB evaluated the proposals for the following areas, giving greatest emphasis to operational capability and cost:

Operational capability focused on each aircraft's ability to perform six missions outlined in the RFP.

The cost evaluation used a concept of "capability per dollar" over a six-year period versus a traditional pricing for specific quantities. The RFP had no specific number of aircraft to be bought, but asked the contractors for price proposals based on a funding profile with three alternatives in the SOW. The first alternative, a so-called "green-line" quantity, was the number of planes the Air Force could purchase within the funding profile by FY after all nonrecurring costs were paid. The second alternative was the number of planes the Air Force could buy from each bidder if they won an equal split of the funding (one-half of the green line quantity). The third alternative was the price of the aircraft at each contractor's optimum production within the total program funding without FY constraints. The key issues were the "green line" proposal and the total LCC for supporting these.

[Unless otherwise indicated, information on the Source Selection Proceedings, pages 30 through 32, was taken from "KC-10--A Study in Commercial Derivative Aircraft Acquisition" (97:26-33) and edited by Major Thomas E. Holubik.]

Supportability addressed maintenance hours per flying hour, worldwide spares availability, and overall system reliability.

Technical risk addressed the risk in modifying the candidate commercial aircraft to a military role.

Management and production focused on contractor and subcontractor management capability and configuration control.

The "commercial" terms and conditions in this contract were evaluated to determine if they enhanced the business arrangement and were acceptable under the Defense Acquisition Regulation.

Schedule evaluation focused on each contractors' ability to meet the schedule, especially initial delivery and the ability to adjust to quantity changes.

The SSEB was tasked to make detailed evaluations on each contractor's technical proposal and contract proposal. During technical evaluations both contractors presented briefings to emphasize their key areas, and to help explain their proposal's content and structure. The SSEB panels evaluated the proposals against established evaluation criteria and sub-factors. Any contractor inquiries for additional information, modification requests to change RFP requirements, and deficiency reports requiring changes were accomplished as provided by source selection procedures. Comparing the proposed contracts against DAR requirements helped the SSEB team prepare for negotiations and preparation of contract documents. As with many SSEB proceedings, complete contracts were to be negotiated with each offeror to accommodate final SSA decision. The SSEB also held a Manufacturing Management/Production Capability Review in each of the contractors plants to ensure they had the ability to integrate the ATCA into their existing production lines. The results of these actions were summarized for the SSAC and SSA.

During December 1976, the ATCA program received a great deal of attention and a surprising increase in program magnitude. The 1976 elections brought a new administration into office, so the new President and his appointees were briefed on the ATCA before they began making decisions on its future and funding level. The Air Force's Presidential Transition Team told them:

> There are not enough tanker assets to simultaneously support the bomber force and tactical deployments in times of crises. Further, our present tanker, the KC-135A, has range and payload limitations that constrain its usefulness.
>
> . . . . . .
>
> The advanced tanker cargo aircraft will be capable of filling our current tanker shortfall in supporting our

> tactical and airlift forces. It will be a derivative of a current FAA-certified wide-bodied aircraft, modified only as necessary to provide an air refueling capability. It will have an inherent cargo-carrying capability, as well (84:8-6).

This information was also provided to the administration in a series of background papers on the ATCA (86:1; 95:1-2; 14:97). In all of this information, no specific numbers of aircraft were indicated and no papers had a rationale for any specific force size. In fact, some papers from within OSD even raised questions about the need for the ATCA. So, it was to everyone's surprise when, on 30 December 1976, a new PBD from OSD directed the procurement of 91 ATCA instead of the earlier approved 41, and increased the total program budget to $5.8 billion. At that point, the ATCA SPO issued a modification to the RFP requesting new pricing proposals from the contractors (13:72).

During 1977 the program experienced another series of perturbations ranging from delightful surprise at the sudden program increase to shock at a sudden suspension and program reduction a few months later. In January the fact-finding and negotiations continued, with emphasis on understanding, clarifying, and revising the SOW, Detail Specifications, Contractor Data Requirements List, and other contractual documents. During February the contractors submitted revised cost and pricing data for the basic contract and the out-year options for the additional aircraft quantity, simulators, peculiar support equipment, and technical services. The contractors were now scheduled to have their final reviews of the contracts, sign, and return them with best and final offers (BAFO) in March.

Then, on 22 February 1977, the President's budget deferred FY 78 ATCA appropriations till FY 79 and the JPO was forced to suspend the source selection proceedings (14:98; 75:78). With the program now unfunded for the first year's production, and its future truly looking doubtful, the Air Force and AFALD began evaluating alternatives for a new, scaled down, or lengthened program (14:98-99). Also, the JPO convened "technical sessions" with the contractors to resolve shortcomings found by the Air Force negotiation team, refine the still-potential contract(s), and clarify the commercially-oriented clauses associated with the warranty and service life issues, options, economic price adjustment (EPA), most favored customer, follow-on price warranty, and FAA requirements.

Force Sizing Considerations

Meanwhile, the force sizing issue was still unresolved. When the program transferred to AFALD in 1976, the generally agreed

Air Force position held there were substantial enough benefits to be gained to proceed with the ATCA program, but no one quantified an optimum number or the extreme ends of the fleet size question:

- What is the minimum essential fleet size of ATCA or ATCA/KC-135 mixes needed to support future war plans?

- What are the risks if no ATCA aircraft are procured?

In October 1976 the Air Force Chief of Staff, General Jones, had asked the Chairman of the JCS to sponsor a study to determine the ATCA force size (101:1-2), and he offered to provide operational and analytical inputs from TAC and the Air Staff in conducting the study. Separately, Mr. E.C. (Pete) Aldridge, Jr., OSD's Director of PA&E asked the DDRE for help in assessing this question (100:1). The results of these studies, if they were accomplished, came too late to keep the program from derailing as it had on 22 February 1977.

On 10 February 1977 General Jones described to Congress the growth in air refueling requirements contrasted with the decrease in tanker capability and discussed the benefits and capabilities to be gained with the ATCA program (55:57-60). General Jones and the Acting SAF, Mr. John J. Martin, reiterated this message in the Air Force's annual Report to Congress (51:28-30). Again, these reports stated no specific number of aircraft. General P.K. Carlton, MAC Commander, later noted, "I believe the recent deferral decision was based on the lack of a convincing force size study. Until such a study is done, reflecting the primary tanker mission based on JCS-approved war plans and future requirements, the problem will continue." He also noted that the Air Force needs to "provide several fleet size options; establish the risk if ATCA is not procured; and establish the ATCA mission and a maximum fleet size beyond which ATCA might well become A-C-T-A" (88:9). At about this time, HQ USAF assessed airlift requirements and alternatives, reaffirmed the capability and flexibility of an ATCA, and had the JPO, MAC, SAC, and TAC develop aerial refueling requirements data, to convince OSD to release the FY 77 funds (14:99-100).

In April 1977 General Jones personally sized the ATCA force at 12 aircraft, and then redirected the program to an initial procurement of 12 aircraft and asked for a plan to examine another alternative for the procurement of an ATCA that could carry outsized cargo (96:1). However, before this was acted on, a different course was being set by OSD, and on 2 June 1977, a new PBD came with the FY 79 POM. It provided ATCA funding for FY 77 through FY 82, but still provided no FY 78 funding. In July Colonel Bell briefed the SAF on potential and real losses to be incurred in the source selection and contract processes due to the delay and affirmed the need for immediate release of FY 77

funding to support a program production start in FY 79. In July, after consultation with President Jimmy Carter, the SECDEF approved the buy of a small ATCA force and issued a tentative PDM for 12 to 20 aircraft, rather than the 91 President Ford had approved before he left office in January (14:100-101; 39:286).

SOURCE SELECTION DECISION

On 2 August 1977 the Air Staff directed the JPO to resume the source selection (76:33). The negotiations continued through October, when a "murder board" convened to review each contract, in detail, prior to the final decision process. BAFOs came on 11 November, final evaluations and reports were accomplished by the SSEB panels, contracts for each contractor were finalized, and Colonel Bell briefed the SSAC of the results. The SSAC reviewed the results and the negotiated contracts, and briefed the SSA. On 19 December 1977 the McDonnell Douglas Company was awarded the contract for a "green line" quantity of 20 aircraft for delivery through FY 82. The schedule required the initial nonrecurring efforts to be accomplished by November 1978; all engineering, the manufacture of the first aircraft, and first flight by April 1980; and all testing to be completed by 31 October 1980. The contract also had five open options for potential increases in quantity to as many as sixty aircraft (1:41; 14:101-102). McDonnell Douglas also won the logistics support contract for the system, leaving the Air Force responsible only for flight line maintenance and maintenance management. This innovative approach was designed to allow the Air Force to take advantage of McDonnell Douglas' commercial structure and system yet remain within acceptable Government procurement practices (14:103).

As expected on a program of this nature and magnitude, there were dissenting opinions on the Air Force's selection. In subsequent hearings on 21 December 1977 before the Congressional Joint Economic Subcommittee on Priorities and Economy in Government, headed by Senator William Proxmire, Major General Charles F. C. Kuyk, Jr., the Air Force's Director of Operational Requirements, explained the rationale used in the source selection decision process; cited the six scenarios used to compare the aircraft capabilities, acquisition costs, and LLC factors; and concluded on behalf of the JCS, that although the Boeing 747 could carry more cargo than the DC-10, the 747 would have given us "less aircraft per dollar," while the DC-10 provided more flexibility in performing the ATCA mission (14:103-104).

Chapter Five

CONTRACT AWARD TO DELIVERIES IN THE KC-10A PROGRAM

OVERVIEW

On 3 January 1978 the initial production contract for the ATCA went into effect, and the attention of the Air Force and the Douglas Aircraft Company (DAC) of McDonnell Douglas Corporation began to focus on manufacturing and production issues. This chapter discusses the contract requirements, describes the KC-10A configuration, and continues the chronological history of the ATCA (officially designated the KC-10A in 1978, and named "Extender" in 1980 because of its ability to extend the mobility of forces (94:2)) for the period 1978 to 1980.

During this hectic period the program continued to experience much of the turbulence and challenge of the past. For example, in 1978 several organizations typically involved with the production, receipt, test, acceptance, and bed down of a new weapon system acquisition joined the action on the KC-10A; funding issues again threatened the program; but most importantly, the SECDEF approved the DSARC III Production Decision. During 1979 the KC-10A entered production, funding issues again threatened the program, and the still unresolved force sizing question came up again. In 1980 DAC held the official KC-10A rollout ceremony, and emphasis shifted from production of this particular aircraft to its acceptance test program and to production of additional aircraft. As a complement to other commercial aspects of the KC-10A, the Air Force procured commercial flight manuals. SAC announced Barksdale AFB, Louisiana, would be the first Main Operating Base (MOB) for the KC-10A. Also, a proposal for a KC-10B enhanced system was considered.

THE CONTRACT

On 3 January 1978 the contracts went into effect, and with them, the Air Force began to exercise several acquisition and support options. The basic contract ran through 30 November 1978, covered initial program planning, engineering efforts, and

long lead order releases. The two major acquisition options depended on the availability of FY 79 funding, an issue that was unstable much of the year. In the first option DAC would accomplish the nonrecurring set up and production, testing, and delivery of one aircraft by October 1980. The second option, for additional aircraft, depended on funds availability. Additional outyear options for FY 80 through FY 83 provided for procurement of a total of up to 60 aircraft, also depending on funds.

There were also options for different elements of logistics support for up to 48 aircraft through 30 September 1985. One of these options covered support equipment and aircraft spares. Another would activate the Contractor Operated and Maintained Base Supply (COMBS) at the KC-10A's MOBs (31:272). A third option covered the maintenance of the aircraft in commercial facilities. These options supported the earlier decided maintenance concept for the Air Force to perform on-aircraft maintenance and store spares for the aircraft at the MOBs. Off-aircraft and depot maintenance would be conducted by DAC and the commercial airlines having DC-10s. This minimized the Air Force's investment and took advantage of existing commercial capability and investment in facilities, parts, and support equipment. This maintenance concept was later challenged by a General Accounting Office (GAO) audit issued in January 1979; however, the Air Staff rebutted the GAO and validated the plan's savings over total organic capability for a fleet of up to 60 aircraft (22:58). The contract also included warranty coverage for five years or 5,000 hours, and a service life of ten years or 30,000 hours (12:131).

[Unless otherwise indicated, the information in the above section was taken from the "History of AFALD" for 1978 (15:90-101) and edited by Major Thomas E. Holubik.]

SYSTEM DESCRIPTION/PRODUCTION CONSIDERATIONS

One of the major considerations in conducting the ATCA system acquisition as a competition between only Boeing and DAC was to have minimal developmental costs and keep the buy "off-the-shelf" as much as possible. The aircraft would not be hardened against the effects of nuclear detonation, and therefore would have no SIOP mission (41:286); however, the DC-10 still needed the following modifications or additions during the production process to become an aerial refueler (1:41-43):

Lower cargo deck. Below the floor, seven integral-body fuel cells would be mounted between special frameworks to restrain the fuel bladders and support part of the side wall pressure loads. The floor would be strengthened to provide cargo load support and to pressurize the cargo compartment.

Cargo handling system. On the main deck, the floor would have "ball mats," power rollers, a wench system and room for 25 or 27 standard Air Force 463L pallets. A cargo door approximately 12 x 8 1/2 feet would be installed on the port side.

Aerial refueling station. This would be installed in the lower aft fuselage area, with accommodations for three crewman (an operator, an instructor, and an observer), and with significant increases in creature comfort and maneuverability over the older KC-135 configuration.

Refueling equipment. An advanced boom and a hose/reel for the probe and drogue systems would be installed in the lower aft fuselage area.

Refueling receptacle. This would be added over the cockpit for aerial refueling of the KC-10A to increase its flexibility in refueling, heavy cargo, or combined deployment missions.

Military avionics. The standard DC-10 systems would be replaced with military communications, navigation and instrument landing systems.

The JPO conducted a Preliminary Design Review (PDR) on each of these, in accordance with the contract requirement to verify that the design concept and preliminary drawings were consistent with the specifications and FAA requirements. The PDR was conducted incrementally during the period May through September 1978 as sets of preliminary drawings were completed (97:66).

Since DAC had already manufactured 253 DC-10 aircraft, and there was little doubt about their ability to produce the basic aircraft, the JPO's Production Readiness Review (PRR) focused on issues regarding changes peculiar to the military configuration and some potential risks with the new aerial refueling boom. As these concerns were resolved during the year, the only serious PRR concern was a strike against DAC by the United Automobile, Aerospace, and Agricultural Implement Workers of America, which threatened to stall production, but was settled before there was any impact on the KC-10A program (15:95). There were eight other factors identified as potentially affecting DAC's ability to accomplish the program on time. These factors were:

- Increasing commercial sales of DC-10s, and correspondingly higher production rates
- Other DAC programs competing for limited resources
- Shortage of skilled manpower in the aerospace industry
- Extended lead times for casting and forging materials

- Difficulty in committing subcontractors because of overall DC-10 program uncertainties and small quantities

- Engineering and production changes from development tests

- Engineering changes evolving from Critical Design Reviews

- DAC's potential reluctance to commit funds to protect the schedule on an uncertain program

During the PRR these issues were considered to be in an acceptable level at this stage of the production effort; however, during the year, in-line production changes and late deliveries of parts by some subvendors did result in short delays in production and delivery of the first two aircraft (18:143).

The final major issue successfully resolved during 1978 concerned the new Aerial Refueling Boom (ARB), which had evolved from the prototype development for the Advanced Aerial Refueling Boom (AARB). The ARB was separate from the ATCA program, and was developed and tested under separate contract. The new boom had greater length, higher flow rate, and better operator control than the KC-135 boom. An extensive test program was conducted at the Air Force Flight Test Center (AFFTC) at Edwards AFB, California. During this program, the boom was flight tested with several receiver aircraft and proved its operational capability while several potential problems with the AARB were successfully resolved. After passing the tests, the ARB became a standard contractor furnished equipment item on the KC-10A tanker (77:35).

PROGRAM MANAGEMENT

During 1978 most of the management control over the program was exercised by the JPO at Wright-Patterson AFB, Ohio, but since closer contact with the contractor was needed, an on-site office was established in May at Long Beach, California, to provide direct liaison with DAC, the FAA, and the resident Naval Plant Representative Office (NAVPRO). This office, initially staffed with three people, matched DAC's liaison office established earlier in the plant, was like other offices in the plant for airlines using the DC-10, and provided the JPO an immediate improvement in resolving questions and issues (1:41). An officer from SAC was also assigned to this office for continual interface with HQ SAC (97:66). The NAVPRO's responsibilities included assisting with engineering, contract production, quality, and logistics matters; providing daily in-plant program visibility for the JPO; administering property transfer and receipt; conducting special studies; and submitting Advance Change Study Notices when contract changes were necessary (15:96).

The funding constraints that stalled source selection processing during 1977 resurfaced again in 1978 when the Senate Armed Services Committee reduced the FY 79 budget from $144 million to $91 million. This reduction would cause the Air Force to break the acquisition contract, since at least $98 million was needed to fund nonrecurring charges and purchase two aircraft. The optimum, "green line," production plan called for four aircraft each year in FY 79 and FY 80, and six aircraft each year in FY 81 and FY 82, to take advantage of discounts offered for an even production distribution. The Presidential budget constraints already forced the Air Force to reduce the FY 79 program to two aircraft and order six aircraft each year in FY 80, 81, and 82; with a resultant cost increase of $8.9 million due to lost discounts and inflation. The predicament soured even more when the POM for FY 80 altered the schedule to two aircraft in FY 79, four in FY 80, six in FY 81, and eight in FY 82; with a resulting increase of $26 million over the "green line" cost estimates (15:97).

By July there appeared to be two alternative solutions to the funding problem: one was to obtain an additional $66 million for the FY 80 POM, and thereby save the program $26 million; the other came as an unsolicited proposal from the ITEL Corporation offering to buy two KC-10A aircraft and lease them to the Air Force for an 18-year period (40:311). Fortunately, the Air Staff's reclama to the Senate won sufficient funds in August to purchase two KC-10As in FY 79 (15:96-98). With the shortage in the FY 80 POM still open, ITEL not only kept its proposal open, but made another (discussed later) in 1979 (16:114-115).

TEST AND EVALUATION PLANNING

The Test and Evaluation Master Plan for the ATCA program was published in February 1978. This plan provided an overview of the entire test program, including the pre-delivery and follow-on testing to be conducted after the first aircraft was delivered. The JPO, acting as the single point of contact between the contractor and the many organizations involved, had a pivotal role in the testing and evaluation activities. Tests prior to delivery would be conducted jointly by DAC, the Air Force, and the FAA to verify compliance with contract specifications and preliminary estimates of operational effectiveness. FOT&E under the direction of SAC would verify the suitability of the ATCA for aerial refueling and determine its optimal operational concepts. In sum, these tests would answer five critical questions (15:93):

- Are the DC-10's basic performance/handling qualities adversely affected by military modifications?

- What design changes need to be made to meet Air Force requirements?

- Can receiver aircraft from the Air Force, Navy, and the Marines rendezvous with and refuel from the KC-10A, and can it be refueled from another KC-10A or a KC-135?

- Can KC-10A transport adequate equipment, personnel, and fuel to support TAC deployment requirements?

- Is the KC-10A system operationally suitable, based on the concept of operations?

Furthermore, the Qualification Operational Test and Evaluation (QOT&E) test plan identified testing that would focus on laboratory and ground tests of the unique KC-10A equipment at the component and subsystem level, flight tests, reliability and maintainability tests, support equipment testing, and technical manual validation. During these tests, DAC, as well as members of the Air Force Test and Evaluation Center (AFTEC), the 3306th Test and Evaluation Squadron of ATC, located at Edwards AFB, California, the FAA, and the operational commands participating in the tests (SAC, ATC, MAC, AFLC, and others) would create data for flight, maintenance, and technical data manuals, and evaluate human engineering factors. This testing, from AFTEC's point of view, had started in 1971 during their investigations of the feasibility of using wide-bodied aircraft for refueling (28:381). Another important part of the testing activity involved evaluating DAC's Type I training (initial cadre, in-plant for aircrew, mechanics, and instructors) and follow-on training packages (30:2, 20-25).

DSARC III PRODUCTION DECISION

Throughout the year, the KC-10A received a number of high level management reviews. General Poe, now Commander of AFLC, found the progress on the program to be satisfactory during a Program Assessment Review (PAR) briefed by Colonel Bell at HQ AFLC. General Poe expressed concern only over the strike at DAC and the lack of a firm decision from SAC and MAC on the location of the first MOB, although eleven different bases had been considered and all but three eliminated because of climate or location (15:94-95; 21:278). Colonel Bell also provided PAR briefings to the Air Staff and the new SAF, Mr. John C. Stetson (15:94-95).

With the myriad of contract award and administration elements described above and favorable PARs illustrating the adequacy of the pre-production actions, the Air Force pushed for a production decision. The acquisition contract was on track. The need for the KC-10A was reaffirmed when MAC responded to a crisis in Zaire, Africa, and later reported that one KC-10A could have replaced the C-141 aircraft used in the operation on a one to

four ratio and would have provided greater flexibility in the response (33:219). On 30 August an AFSARC (Air Force's counterpart to the DSARC) met and gave a positive production recommendation (78:102). On 13 October 1978 the planning phase of the logistics support contract was exercised and completed. By the beginning of November, OSD was prepared to release the FY 79 funds to the JPO, as soon as the DSARC III production go-ahead was made. The SECDEF, Mr. Harold Brown, gave this approval on 6 November 1978 and the DCP was signed on 18 November 1978 (48:1). On 20 November the JPO awarded production options 1 and 2 for the nonrecurring costs and the first two aircraft. The KC-10A acquisition was now in the Production Phase.

1979: THE PRODUCTION PHASE

During 1979 the major issues for the KC-10A program concerned further planning for production, the perpetually vulnerable and open funding situation, and deployment and site activation issues regarding the first MOB. These issues continued the KC-10A program's haunting legacy of challenges while providing further proof of the JPO's ability to successfully respond with good program management. In this light, if promotion is a sign of success, the KC-10A program had become a success story, as Colonel Kenneth H. Bell, the Director of the JPO since 1974, was promoted to Brigadier General in July 1979 (16:108).

On the production side, the KC-10A went into production, and while there were no serious delays, a number of issues arose. Assembly of the first fuselage sections started on 27 March 1979 at the Convair Division of General Dynamics, in San Diego, California. These sections were barged to DAC in Long Beach, where subassembly began in June, and the final production started in October (16:109-110). Some minor manufacturing delays occurred, as there was a resurgence of commercial business throughout the aerospace industry. The crash of a DC-10 on 25 May 1979 at O'Hare International Airport in Chicago also caused the program some concern, but no real delay. This airline incident, the worst in US history, had 274 fatalities when the aircraft's number one engine and pylon tore loose, flipped over, and critically damaged control lines. The FAA first grounded all DC-10s, as preliminary investigations found pylon faults throughout the fleet, and then suspended the aircraft's type design certificate when other flaws were discovered. These deficiencies were resolved with help from engineers in ASD who assisted in the investigations of the DC-10's airworthiness, design, and maintenance procedures; and although the crash involved a different model DC-10, some corrections were made in the KC-10A's final configuration (8:2-3).

Three funding issues arose during the year. The first came as a result of the DC-10 crash, when Senator Proxmire proposed an amendment to the Senate Appropriations Bill that "no funds authorized by this bill [for FY 80] may be obligated or expended on the KC-10A ATCA until the FAA has reissued the type certification for the DC-10 and the Secretary of Defense has certified in writing to the Congress that the DC-10 is structually sound" (16:109). In reply, the Air Staff demonstrated the aircraft's structural integrity, and the resolution was not included in the final bill (22:57).

The second funding issue concerned the inflation factors used in preparing budget estimates for funding purposes. The JPO forecast used EPA factors as called for in the contract. This resulted in a $61 million higher cost than the OSD directed factors. Rather than decrease the size of the aircraft buy, the Air Staff agreed with the JPO, and used the higher EPA factors (22:57).

The third funding issue concerned ITEL Corporation's earlier unsolicited proposal from 1978 to buy, then lease two KC-10A aircraft to the Air Force. This would provide the KC-10A to the Air Force faster than it could fund them for itself, and possibly preserve some of the "green line" acquisition savings available to the Air Force. ITEL estimated the Air Force could save $8 to $80 million, depending on the number of aircraft and the timing involved in accepting the offer. The offer was politically sensitive in light of the funding problem the Air Force already had in getting approval for the KC-10A program and its newly emerging program for re-engining the KC-135. There was also an obstacle in funding such a lease plan through the Air Force Industrial Fund, a fund controlled by MAC, which could give the appearance that the cargo role was dominant over the refueling mission that had been the key in getting the program approved by Congress. In early 1979 ITEL submitted a new offer, to purchase two DC-10/KC-10A positions on the DAC assembly line at a fixed price, make them available for the Air Force to buy back (at a $1 million markup) a year later when the funding situation was clearer, and thereby clearly preserve the "green line" savings. If the Air Force could not repurchase the two positions, ITEL would take delivery of the two aircraft with no obligation to the Air Force. This proposal was not acceptable to DAC since it would allow another source access to the favored customer status the Air Force held. ITEL briefed its offer to the SAF, the Chief of Staff, and the Commanders of SAC, MAC, TAC, AFLC, and AFALD; and although the Air Force did not reject ITEL's offers, it did not accept them either (16:114-115).

From the Air Staff perspective, a significant issue in the KC-10A program was resolved when the first MOB was selected and a number of long lead actions were triggered (79:11). Several

bases were considered and evaluated for space, facilities, future commitments, weather, and local impact considerations. On 22 May 1979 the Air Staff gave public notification that the first MOB would be Barksdale AFB, Louisiana (31:20). During 1979 a KC-10A Site Activation Task Force (SATAF) was assembled and met three times to assist in the upcoming beddown. The SATAF was not a formal organization, and had no real power to resolve problems, but it advised and assigned action items to appropriate organizations. In August the JPO met with the SATAF and provided extensive briefings on the logistics and activation milestones, including both Air Force and contractor actions and planned developments (16:110-112). In October a renovation project began converting the former base commissary facility into the COMBS facility (31:35).

SAC also addressed another long lead process in July 1979, as it began recruiting air crews for the KC-10A. The initial crew cadre had already been selected, but thirteen follow-on crews would be needed in 1981. A basic crew would have two officers, a pilot and a copilot, and two enlisted members, flight engineer and an in-flight refueling operator. For missions with cargo, an enlisted load master would also be needed (31:111). This recruiting drive had its challenges, since SAC was already having intense pilot retention problems. An interesting technique SAC used to staff the aircrews was its successful determination to have reservists comprise 50 percent of the crews, and the subsequent activation of a reserve associate unit at Barksdale AFB in October 1980 (32:19).

The force sizing question was still unresolved in 1979. The GAO was highly critical of the Air Force for not having quantitative determinations for either the KC-10A program or for the newly developing KC-135 reengining program (16:113). An Air Force System Acquisition Management Inspection Team sponsored by the Inspector General keyed on the same issue, and recommended the Air Staff ensure that thorough requirements studies be completed before future contractual commitments were made. Within HQ USAF, the Assistant Chief of Staff for Studies and Analysis began conducting such a study (53:59).

1980: ROLLOUT AND DELIVERIES

In April 1980 DAC held the official rollout of the KC-10A "Extender," and the program emphasis shifted from production of this first aircraft to its test program. For the most part,

[Unless otherwise indicated, information in this section, pages 43 to 45, was taken from the History of AFALD for FY 80 (17:97-103) and edited by Major Thomas E. Holubik.]

DAC's production program had gone smoothly, and the KC-10A program was on schedule. In fact, in November 1979 the Air Force exercised acquisition and logistics contract options for four more aircraft, making a total of six aircraft on order in a growing acquisition program which now called for 32 aircraft. The first KC-10A came off the production line on 16 April 1980, but during ground tests a problem was detected with the aerial refueling system pressure testing, and this ultimately delayed its delivery by three months. On 12 July 1980, after some rework and a thorough readiness review, the aircraft had its maiden flight, a 4.3 hour trip from Long Beach, California, to Yuma, Arizona, and began its extensive pre-delivery test program. During this 617-hour program, conducted by DAC, AFTEC, and AFFTC, the KC-10A proved it was not adversely affected by the military refueling modifications and that it still had its excellent DC-10 handling qualities (19:143). Of particular concern, the flight tests showed there was no impingement on the T-tail of the C-5 aircraft from the KC-10A center engine. The test program also identified and resolved a minor problem with the ARB at high speeds. On 30 October the KC-10A refueled a C-5 as its first regular customer. These tests also included a five-week ground study to validate technical orders, demonstrate aircraft maintainbility, and examine support equipment compatibility (19:143). Meanwhile, production continued, and the second through sixth KC-10As came off the manufacturing line and entered similar tests (18:146).

During 1980 the JPO continued its hallmark innovative use of commercial practices and the application of LCC improvements, by acquiring commercial air crew training and flight manuals and participating in DAC's product improvement program. The JPO's approach for aircrew training, approved by SAF in January 1980, was to obtain a total system to minimize KC-10A flying hours for training. In July 1980 the JPO awarded a contract to American Airlines for air crew training and later, another contract for a KC-10A simulator. With this approach the Air Force begin to receive trained air crews in July 1981. Since most maintenance was to be performed by logistics support contract, the maintenance manuals were already in commercial format (22:7). With SAC's concurrence, the JPO worked with DAC, drafted previously unheard of commercial specifications for the flight manuals, and acquired them in commercial format, too. DAC's investment in product improvement research on the DC-10 resulted in several benefits, particularly in the use of composite structures and a "fuel savings advisory system" (23:103).

It is not uncommon for a weapon system program to generate a follow-on, or enhanced system, and the idea for a KC-10B arose in July 1980 (23:100-103). This program would allow the KC-10 to carry "outsize" cargo, such as the Army's XM2 infantry fighting vehicle, the XM3 cavalry fighting vehicle, the M35A2 truck, and light observation helicopters. To accommodate such equipment,

design changes would increase the cargo door to approximately 14 x 10 feet, reinforce the main cabin floor, revise the location of certain equipment in the main cabin area, modify the cargo handling system, and develop a new pallet. There were several drawbacks to the KC-10B; however, such as a decrease in unrefueled distance by about 200 miles, loss of provision for carrying 55 passengers, loss of commonality with the KC-10A and DC-10, and an additional cost of $1 million per aircraft. At the end of 1980 any hope for developing a KC-10B vanished when General Poe, now Commander of AFLC, declared (24:287-288):

> I was going to die right in the door of the KC-10 before it was enlarged as some MAC and SAC people wanted. It would have cost another million dollars per airplane and would have made it about 81 percent common with the civilian model instead of 88 percent common as planned. I absolutely refused to even talk about it.

Chapter Six

PRODUCTION AND DEPLOYMENT IN THE KC-10A PROGRAM

OVERVIEW

During the period 1981 through 1987, the KC-10A program moved into full scale production, and the program managers' interest transitioned from activities involved with planning and testing to those more concerned with delivery, acceptance, and maintenance of the aircraft. In 1981 DAC ceremoniously delivered the first KC-10A, and then five more. SAC put these aircraft through a rigorous acceptance program and began proving the system's operational capability and reliability. The commercial nature of the program continued, as the JPO contracted for aircrew and maintenance training. In an ironic reversal, HQ USAF directed AFSC to reassume acquisition responsibility for the program in 1982. Program funding and force sizing were finally resolved, and a multiyear procurement approach stabilized the uncertainties of the past. SAC opened two more MOBs, and found the aircraft's deployment, performance, and maintenance were all occurring about as ideally as they could be. Finally, as a mature system with a total fleet size nearing 60 aircraft, the final PMRT transferred program responsibility to the OC-ALC. In presenting the interesting details of these exciting years, this chapter completes the acquisition history of the KC-10A program.

1981: DEPLOYMENT

On 17 March 1981 the Air Force accepted the first KC-10A "Extender" from the contractor, activated the first MOB at Barksdale AFB, and began acceptance testing activities (24:288). Additional aircraft came off the production line throughout the year, and by December, DAC had delivered a total of six aircraft. Initially, an extensive acceptance test was conducted on these by SAC and AFTEC (46:40-41). Then FOT&E, similar to that given all new aircraft joining the Air Force inventory, was conducted by Detachment 2, 4200th Test and Evaluation Squadron at Barksdale, before the KC-10A was certified "fully operational" (34:61). During the FOT&E, some problems were identified and corrected on the refueling hose reel system, the lighting system for night

refueling, and the refueling nozzles, but a permanent fix on the nozzle problems would not be completed until 1982 (9:173-178). There were also several minor deficiencies identified and corrected as a result of 175 service reports and 122 material improvement projects. While these deficiencies caused the FOT&E to be extended, their identification and correction contributed to the KC-10A becoming a reliable system (29:378).

During 1981 several operational experiences established the KC-10A as an important, effective tool for projecting U.S. and allied forces world wide (18:Ex 18). In a May-June exercise called "Coronet Canvas," the aircraft carried 48 personnel and 80,000 pounds of support equipment while it accompanied and refueled (five times each) eight A-7s, in a nonstop trip from Tulsa, Oklahoma, to RAF Wittering, England (29:381). The KC-10A itself was refueled by three KC-135s during the flight. While in Europe the aircraft was shown at the annual Paris Air Show, and before redeploying, it set a record of sorts when it passed 200,000 pounds of fuel during a single mission. The use of the KC-10A in Coronet Canvas precluded the use of four KC-135s and two C-141s that would have been needed for this mission, thereby saving the Air Force about $300,000 in fuel and operations and maintenance costs (29:382). Other missions carrying personnel and cargo, and ferrying groups of aircraft between CONUS and Europe further proved the KC-10A's capabilities (18:146-147).

The performance of the logistics support contractor and the reliability of the KC-10A system were also impressive (18:151-152). The logistics support contract called for semiannual evaluations of the Douglas Product Support Division (DPSD) and specified challenging levels to be met in a number of standard operational and support indicators, such as the aircraft's Full Mission Capable rate, Mission Completion Success rate, and Non Mission Capable and Partial Mission Capable Supply indicators. In the first review, held in September 1981, the JPO rated the contrator performance as "exceptional," found few areas needing improvement, and made few recommendations. An example of this exceptional support occurred later that month in Aalborg, Denmark. One of the two KC-10As returning 12 F-15s, 29 pallets of cargo, and 120 support personnel to Holloman AFB, New Mexico (29:382), suffered a breakdown situation which had never before happened to a DC-10 or KC-10A: an axle on the main landing gear broke. This warped the main truck assembly, but caused no other damage. While this prevented the KC-10As from supporting the instant mission, the repair at this remote site was impressive. With minimal maintenance facilities, DPSD fixed the aircraft in only 74 hours, and solidly proved the commercial supportability to maintain the aircraft virtually anywhere in the world (18:147-148). In later evaluations, the JPO continued to rate DPSD's service as high as "outstanding" (19:161-162).

Athough most of the elements of the training program were programmed or fully operational by June 1981, the permanent training facility at Barksdale was not completed until February 1983. The delay primarily affected the Air Force's use of the flight simulator, which arrived in November 1982 and had to be placed in storage. Until the new facility was completed, SAC trained KC-10A pilots at American Airlines' facilities in Dallas, Texas. Other crew members trained at Barksdale in an interim facility housing a boom operator trainer, a cockpit procedures trainer, a cargo loading trainer, and a set of computer based teaching machines with real time computer interface, known as "Plato," for teaching individually paced courses. The total training program was conducted and managed by American Airlines under contract support (18:148-151).

During 1981 program funding once again experienced a wide swing. On 13 February 1981 the Air Force signed the FY 82 option for six KC-10As (for a total of 12 by the end of FY 82). On 2 April the new JPO Director, Colonel Gordon E. Fornell, briefed the SAF on an option available to the Air Force, to purchase eight aircraft in FY 82 and then buy out the 40 aircraft remaining on the contract in FY 83, with deliveries through FY 87, and thereby preserve the price of the original contract and save some $777 million in manufacturer's discount and inflation avoidance. In late August 81, however, OSD cut the program for FY 83 and beyond, to zero. This would have limited the entire fleet buy to only 12 aircraft. The rebuttal, led by Colonel Fornell and Colonel William H. Glendenning of the JPO and Lieutenant General John G. Albert, the Commander of AFALD, in September received no answer until November, when Congress approved funds for only four aircraft in FY 82 but made no commitments on the out-year program (18:153-155).

PROGRAM TRANSFER BACK TO ASD

During 1979 a proposal arose to return responsibility for the KC-10A program to AFSC and ASD. The KC-10A program had been placed in AFALD, an AFLC organization, in 1974, to emphasize to industry the seriousness the Air Force was giving LCC management issues. In early 1978 AFLC and AFSC began examining some of the problems in making the traditional PMRT from AFSC to AFLC. While the two commands did not resolve any particular issues, they did review some 140 systems currently under development or being acquired by ASD, and identified more than 60 which would likely transfer during the next three years. However, in early 1979 they could not agree on several PMRT issues on the TR-1 program, and the problem surfaced to the Air Staff. General James A. Hill, the Vice Chief of Staff, then directed a full scale review of the weapon system acquisition and support process and formed a team to examine the assignment of functional responsibilities for

major weapon systems, the process of PMRT, and the adequacy of using LCC in systems acquisition. The team was under the direction of (retired) Lieutenant General Maurice F. Casey; and since its principal members were Brigadier General Richard E. Saxer of ASD, representing AFSC, and Colonel (Brigadier General selectee) Donald P. Litke of OC-ALC, representing AFLC, the review became known as the "Litke-Saxer Study." In their review, the team focused particular attention on the KC-10A and TR-1 programs. In August 1979 their final report identified a number of overlapping AFLC and AFSC functional areas "which should be minimized in the current resource constrained environment," and it contained 15 recommendations. One of these called for creation of a new organization in ASD, a "Deputy for Commercial Variant and Limited Development Aircraft," to include both program management and logistics support from AFSC and AFLC, which would manage a weapon system for its entire life cycle (22:196-204). Subsequently, program responsibility for the KC-10A proved to be a bone of contention between AFLC and AFSC. In early 1981 General Poe stated that he believed the issue predated the Litke-Saxer recommendations, and was actually (24:288):

> caused by circumstances . . . in 1976. They [AFSC and ASD] had no new programs approved, there were a lot of people who were beginning to wonder if they were going to be employed or not, and they hated to see this program [the ATCA] go to a bunch [AFLC/AFALD] who didn't know how to do anything else but put boxes on shelves.

On 14 December 1981, HQ USAF directed AFSC to assume the responsibility for the KC-10A program, effective on 1 February 1982. Planning for the transfer started immediately, and while the transfer officially took place in February, some issues regarding manpower authorizations and funding were too difficult to resolve that quickly. In the final transfer action to ASD's Airlift and Trainer SPO in July 1982, the Commanders of ASD and AFALD signed an agreement on the remaining open residual responsibilites for the program (9:3-4). AFALD continued to retain an interest in the program through the DPML and the ILS personnel collocated in the ASD SPO (19:162-163).

1982 THROUGH 1987: FORCE SIZING, FUNDING, PRODUCTION, DEPLOYMENT, AND FINAL PMRT ISSUES

During 1981 the issues regarding the force sizing question and program funding uncertainty, which had nagged the program for so many years, were finally settled. In April SECDEF Caspar W. Weinberger released the results of a Congressionally-mandated study on the anticipated shortage in military airlift (9:3-4). This study recommended, among other things, the acquisition of 44 more KC-10A tanker/cargo aircraft, for a total of 60 (9:162).

Furthermore, while multiyear contracting had been a top initiative in AFSC since 1978, few programs had been approved by Congress (10:221-225). Multiyear procurement sought to stabilize the purchase of major weapon systems over several years, reduce costs, and encourage productivity in the defense industry. In December 1981 Public Law 97-86, "The DOD Authorization Act for 1982," made multiyear contracting a national priority (27:225). Accordingly, Deputy SECDEF Frank Carlucci approved the Air Force's multiyear procurement of 44 KC-10As during the period FY 83 through FY 87. This plan was approved by the House and Senate Armed Services Committees and Appropriations Committees on 20 May 1982 (25:159-160), and set the stage for the Air Force to award a $2.8 billion multiyear contract at the end of 1982 (9:172-173). While this plan settled the program's force sizing and funding issues, it opened the door for an "ownership" issue between SAC and MAC because of the predominant emphasis on the airlift versus the refueling mission for these last 44 aircraft. In the end, General Lew Allen, the Air Force Chief of Staff, decided in favor of continuing SAC's ownership, and left SAC and MAC to resolve some residual issues on maintenance responsibility when the aircraft operated under MAC control, and operational command and control while in a dual tanker/cargo role (42:32).

SAC activated the second MOB for the KC-10A, at March AFB, California, in August 1982, and the 9th Air Refueling Squadron became operational when it received its first aircraft on 4 August. The JPO again participated in the SATAF to help coordinate all the actions needed. The March AFB COMBS facility began full operations on 28 August 82 (19:161). SAC continued the operational flying program it had started at Barksdale AFB, calling for a 50-50 mix of active and reserve forces (42:331-332). In December SAC also announced the third MOB would be Seymour Johnson AFB, North Carolina, and surveyed Robins AFB, Georgia as a possible fourth MOB (43:43).

During 1982, SAC finished the second phase of the FOT&E and concluded the aircraft was "basically sound." These tests and evaluations had included cargo exercises, cold weather tests, drogue refueling systems, the "I" and "J" bands in the rendezvous radar beacons, operational concepts, command control procedures, technical orders, air crew and maintenance training programs, and the simulators. The only unsatisfactory area concerned the flight manual's lack of system information and its poor format in the section on emergency procedures (42:332).

During 1983, the final PMRT was planned. Before the ultimate force sizing decision and the 1982 transfer to ASD, a traditional PMRT had not been foreseen, although at some point one of the ALCs would be designated to take the system manager's role. General James P. Mullins, the new AFLC Commander, selected OC-ALC because of its experience with the KC-97 and KC-135, its "established

rapport with SAC relative to air refueling support," and its experience with other wide-bodied aircraft like the E-3 and E-4 (25:15). Accordingly, planners at OC-ALC began making some advance arrangements (19:163). In 1983, AFSC and AFLC agreed to transfer the logistics support contract and managmement responsibilities after delivery of the 60th, or last production KC-10A (10:186).

By the end of calendar year 1983, much of the acquisition excitement of the previous fifteen years of the KC-10A program had settled. SAC had received 20 KC-10A aircraft, most refueling and cargo operations had become routine, as the "Extender" continued to demonstrate exceptional flexibility and capability as an airlift and refueling aircraft. The Reagan Administration continued funding the program, and the SPO had a firm multiyear order. The program estimates for the 60 aircraft in FY 76 and in "then year" dollars were $2.03 billion ($33 million each) and $4.12 billion ($68 million each), respectively (10:85-186). The only significant problems during 1983 were with the refueling system's telescoping drive chain for the refueling boom and a persistent problem with inadvertent nozzle separations. The drive chain situation was corrected by making the chain heavier and by changing the heat treating in the manufacturing process. Various aspects of the nozzle problem, however, had persisted since the first KC-10A delivery and continued until a successful fleet-wide engineering change corrected the condition in mid-1985 (10:186-187).

During 1984 the KC-10A program continued at a steady pace, with few production or operational problems, much as in 1983. DAC delivered eight more KC-10As, bringing the total to 28 (11:202). The aircraft's performance in carrying cargo and refueling continued to perform impressively, although a few problems with the refueling system continued. In particular, in an unfortunate refueling incident in June, the hose for the hose and drogue system failed to retract, whipped around, cracked, and spilled fuel, which was sucked into the engine of the Navy A-4 being refuelled. The A-4's engine caught fire, the pilot ejected, and the plane crashed into the ocean (11:204). This incident emphasized the problem and ultimately led to some corrections. In an interesting 1984 development, SAC requested a camouflage paint scheme to make the aircraft less vulnerable to detection. The Air Staff assessed two-color and three-color schemes, and approved a two-color scheme having a dark, flat gray top with the existing glossy, light gray bottom, to be effective with the 26th production aircraft (10:202-203).

During the period 1985 through 1987 production and deliveries ran at a fast rate and the acquisition program began to phase out. The total fleet grew to 59 aircraft, and deliveries of the last two aircraft were expected in April and November 1988.

Barksdale AFB became the first fully configured KC-10A base, and March AFB and Seymour Johnson AFB were not far behind (44:455). DAC fixed the hose and drogue system problem by making a few technical modifications, by fine tuning the procedures to bleed off residual fuel pressure after refueling operations, and by adding steps to help the boom operator determine whether the system is properly functioning (12:132). To facilitate loading and unloading cargo without needing prepositioned wide-body loading equipment, ASD began to acquire thirty integral cargo handling systems for the fleet. ASD also began to make the final PMRT in phases, transferring the logistics support contract to OC-ALC in October 1985 and the remainder of the program, except for certain residual task responsibilities, in October 1987 (12:132; 99:--). Although a KC-10A was destroyed by fire on a ramp at Barksdale AFB in mid 1987, there were no plans to replace it nor any further plans to buy additional KC-10As (99:--). The only modification foreseen in January 1988 was a wing tip refueling system projected for the 1992 timeframe (98:--).

This concludes the historical review of the KC-10A aircraft acquisition program. The next chapter discusses and analyzes several of the program's unique features.

Chapter Seven

ANALYSIS OF THE KC-10A ACQUISITION

OVERVIEW

The main body of this paper provided a chronology of the KC-10A's twenty-year long acquisition program and used the major system acquisition process as a road map for this account. Each acquisition program is different from all others, yet each shares this basic, dynamic map. Several distinct issues and challenges deserve additional analysis and discussion. These are addressed below as lessons learned or observations which may be helpful as considerations or alternatives in other programs.

SYSTEM DESIGN VERSUS COST CONSIDERATIONS

Purchase of a commercial derivative, "off-the-shelf" system does not allow the Air Force very much opportunity in design features, although by acquiring this "off-the-shelf" system, the Air Force realized great advantages in savings and flexibility. In fact, the KC-10A, which is merely a DC-10 freighter with seven fuel tanks installed below the main deck and a refueling boom placed on the tail for its refueling mission, is inefficient as a pure tanker aircraft since the girth of the wide bodied jet is a result of designing a fuselage for hauling bulk cargo. A pure fuel carrying aircraft would not have this extra cubic space and would therefore be smaller and more aerodynamically efficient. In fact, "an 'ideal' tanker would have a small body and a large wing in which the bulk of the fuel could be carried instead of the fuselage" (3:46; 19:190). A specially designed tanker would likely fly higher and faster, and perform more efficiently than an aircraft designed for cargo and then given the refueling mission.

The commercial derivative KC-10A aircraft was more affordable than designing a new aircraft. In studies sponsored by ASD in 1968, Boeing and Lockheed found that research and development costs for a new, pure tanker would likely exceed $1 billion, and to be cost effective, the production run would have to be over 100 aircraft. Indeed, McDonnell Douglas and its subcontractors invested about $2 billion in developing the DC-10, and its produc-

tion run has gone to over 435 aircraft (90:4). The Air Force began buying KC-10As after DAC had manufactured over 250 DC-10s, and DAC was well down the learning curve line, which helped keep their costs and our price down. The Air Force also benefitted by buying the aircraft in a competitive situation against Boeing in a greatest-capability-for-the-dollar competition.

The Air Force saved significantly in other ways, too. By contracting for maintenance support of the KC-10, the Air Force tapped into an established maintenance network of 50 airlines worldwide flying the DC-10 and took advantage of the 88 percent parts-commonality between the KC-10A aircraft and the DC-10, instead of investing alone in spare parts and support equipment. In both acquisition and logistics support, the Air Force used firm fixed price contracts, again taking advantage of the DC-10 system maturity and the business situation. The Air Force also saved by having a "lean and mean" SPO with fewer than 60 people, a marked contrast to the "super-SPOs" of over 200 personnel for other major acquisition programs. Finally, as a cargo/tanker aircraft, the "Extender" has lived up to its name by extending the mobility of forces, while giving the Air Force extraordinary flexibility in providing combined refueling and cargo carrying missions for overseas deployments without needing forward bases.

"COMMERCIAL" CONTRACTING CONSIDERATIONS

In the contracting arrangements for the KC-10A program, the Air Force initially had a challenge in understanding and dealing with the "commercial" nature of the contract. The Government's unique general provision clauses, periodic payment arrangements, and the details of EPA clauses differed from those proposed by the contractors in response to the RFP. Also, during the source selection process, the Air Force had some difficulty establishing agreements with the contractors to meet Government requirements for access to certain contractor records, audit by the Defense Contract Audit Agency, and review by contract administration service offices. To overcome these obstacles, which in future commercial contract arrangements should be addressed in the RFP, the JPO interpreted certain Government contract clauses to fit the commercial mode and sought to understand and adopt the more-flexible commercial provisions (19:184; 97:15-17). Using this commercial contracting approach gave the Air Force a great deal of flexibility. Furthermore, relying on the quality control aspects of the FAA provided the Air Force an important and powerful team member not always available in purely military aircraft buys. Since the Air Force has now had several successful "commercial" contracting experiences (KC-10A, European Distribution System Aircraft, and the Presidential aircraft), this option is now readily considered when it appears that an "off the shelf" aircraft can meet the requirement.

SOURCE SELECTION TIME CONSTRAINT

The source selection process was initially planned to be accomplished on a compressed schedule beginning in November 1976 and ending in March 1977 to beat a deadline for a funding window. In February 1977 the President's budget for FY 78 cancelled the ATCA funding. Accordingly, the source selection proceedings officially ceased for almost six months. During the pause, the JPO did a great deal of necessary research. More specifically, the JPO continued to hold "technical sessions" with McDonnell Douglas and Boeing to clarify and understand the commercially-oriented contract clauses, obtained copies of commercial airline contracts from the Securities and Exchange Commission, and obtained help from a reserve officer experienced in commercial aircraft contracting (97:32-33). Had this suspension in the source selection not occurred and allowed for this research, understanding, and the necessary changes; the Air Force may have accepted some inappropriate, unfavorable, or misunderstood terms and conditions. When using a new or unfamiliar contracting approach, expecially in a high value contract such as this, it seems that our purposes are better served with a careful, pragmatic, and thorough evaluation, rather than a hasty one.

FORCE SIZE

In the early development of the ROC and the acknowledgement that the Air Force needed a new aerial refueler, no one developed an objective, quantified force sizing model to substantiate how many aircraft were needed. Instead, the planners indicated that having an ATCA was a good idea and the more we could buy, the better. Consequently, the program had an unusual, and certainly awkward, profile as it went through the funding cycle. Indeed, this was a nagging problem for several years and contributed to some of the program's perturbations over the years.

Generally, a need is presented in terms of: "Here's what we need, and here's what it will cost for various levels of operations." The ATCA program came across with: "Here's this great idea, one airplane would improve our capability, two would improve it more, . . . X number would improve our capability still more, how much money will Congress give us to buy as many as we can?"

In our PPBS with its continuous cycle of reviews by the Air Staff, the Air Force Secretariat, the OSD staff, the SECDEF, the President, and the Congressional committees in the House and Senate, this deficiency would have left the program exposed to the same kind of subjective logic on the back side; i.e., "Here's how much someone has decided to allocate for the program. This could buy X number of aircraft. If I cut it one or two aircraft,

the Air Force would still have X minus one or two aircraft, but would still have an improved capability, and I could put the rest of the money somewhere else." This kind of reduction logic and action would happen more easily in a tight budget atmosphere.

Without objective criteria for what is needed, planners cannot define exactly what the need is, nor can they determine if the need has been adequately satisfied.

AFLC AS PROGRAM MANAGER

When procurement authority for the ATCA program was placed in the newly created AFALD organization, an early concern was that unless the ATCA was to be a precursor to additional AFALD acquisition programs, there would be no long range benefits to an AFALD program management capability. As it turned out, the KC 10A program did not serve a trail blazing role in AFALD; however, this experience was not wasted effort. In having procurement responsibility for five years or so, AFLC had the opportunity to work with a number of different offices in the operational commands (SAC and MAC, in particular), the Air Staff, and the Secretariats of the Air Force and OSD. This "career broadening" experience certainly benefitted AFLC and the other offices by giving each an insight, understanding, and appreciation of the complexity and sensitivities of each other's problems in acquiring and fielding a new weapon system. AFLC also gained a considerable understanding of AFSC's concerns when a system is undergoing PMRT. Indeed, this was a worthwhile exchange.

CONCLUDING COMMENTS

This history of the KC 10A acquisition documents a highly innovative and successful program. Over twenty years ago the Air Force began considering the acquisition of a new tanker aircraft to supplement the KC-135 tanker fleet. The weapon system acquisition process allowed the Air Force to take an innovative approach and procure an "off the shelf" system with commercial contracting techniques. This approach worked well and the KC 10A system has proven to be an impressively reliable tanker/cargo system for enhancing military mobility. Because of these favorable results, and ever tightening budgets, the Air Force will probably use commercial practices to acquire other systems which can satisfy military requirements. It is hoped this account fairly represents this successful program and encourages other programs to pursue a "commercial" acquisition when it makes sense to do so.

GLOSSARY

AARB	Advanced Aerial Refueling Boom
ADC	Aerospace Defense Command
ADM	Acquisition Decision Memorandum
AF	Air Force
AFALD	Air Force Acquisition Logistics Division
AFB	Air Force Base
AFFTC	Air Force Flight Test Center
AFLC	Air Force Logistics Command
AFR	Air Force Reserve
AFSARC	Air Force System Acquisition Review Council
AFSC	Air Force Systems Command
AFTEC	Air Force Test and Evaluation Center
AL	Acquisition Logistics
ALC	Air Logistics Center
APP	Advance Procurement Plan
ARB	Aerial Refueling Boom
ASD	Aeronautical Sytems Division
ATC	Air Training Command
ATCA	Advanced Tanker/Cargo Aircraft
COMBS	Contractor Operated and Maintained Base Supply
CONUS	Continental United States
D&F	Determination and Finding
DAB	Defense Acquisition Board
DAC	Douglas Aircraft Company
DAE	Defense Acquisition Executive
DAR	Defense Acquisition Regulations
DCS	Deputy Chief of Staff
DCP	Decision Coordinating Paper
DDRE	Director, Defense Research and Engineering
DOD	Department of Defense
DPML	Deputy Program Manager for Logistics
DPSD	Douglas Product Support Division
DSARC	Defense Systems Acquisition Review Council
DT&E	Development Test and Evaluation
EPA	Economic Price Adjustment
FAA	Federal Aviation Agency
FOT&E	Follow on Operational Test and Evaluation
FSD	Full Scale Development
FY	Fiscal Year

FYDP	Five Year Defense Program
GAO	General Accounting Office
HQ	Headquarters
ILS	Integrated Logistics Support
ILSP	Integrated Logistics Support Plan
IOT&E	Initial Operational Test and Evaluation
JCS	Joint Chiefs of Staff
JPO	Joint Program Office
LCC	Life Cycle Cost
MAC	Military Airlift Command
MAJCOM	Major Command
MARS	Multi-point Air Refueling Study
MENS	Mission Element Need Statement
MM	Material Management
MNS	Mission Need Statement
MOB	Main Operating Base
NAVPRO	Naval Plant Representative Office
OC-ALC	Oklahoma City Air Logistics Center
OMB	Office of Management and Budget
OSD	Office of the Secretary of Defense
OT&E	Operational Test and Evaluation
PAR	Program Assessment Review
PBD	Program Budget Decision
PDM	Program Decision Memorandum
PDR	Preliminary Design Review
PMD	Program Management Directive
PMP	Program Management Plan
PMRT	Program Management Responsibility Transfer
POM	Program Objective Memorandum
PPBS	Planning, Programming, and Budgeting System
PRR	Production Readiness Review
QOT&E	Qualification Operational Test and Evaluation
R&D	Research and Development
RDT&E	Research, Development, Test and Evaluation
RFP	Request for Proposal
ROC	Required Operational Capability
SAC	Strategic Air Command
SAF	Secretary of the Air Force
SATAF	Site Activation Task Force

SECDEF	Secretary of Defense
SIOP	Single Integrated Operations Plan
SON	Statement of Need
SOW	Statement of Work
SPO	System Program Office
SSA	Source Selection Authority
SSAC	Source Selection Advisory Council
SSEB	Source Selection Evaluation Board
TAC	Tactical Air Command
USAF	United States Air Force

BIBLIOGRAPHY

Articles and Periodicals

1. Fink, Donald E. "DC-10 Tanker/Cargo Program Starting." Aviation Week & Space Technology, 16 January 1978, pp. 41-43.

2. Gibson, Billy R. "A Short History of Aerial Refueling: Casey Lowers the Boom." Aerospace Historian, Vol. XV, No. 2, Summer 1968, pp. 12-17.

3. Glines, C.V. "Is there a New Tanker in the Air Force's Future?" Armed Forces Management, Vol. 15, No. 12, September 1969, pp 44-46.

4. Pamentel, Laurence A. "A Rugged Bird." Combat Crew, Vol. XXXIII, No. 10, October 1973, pp. 28-30.

5. Powell, Craig. "Tanker/Cargo Aircraft: Hybrid for the Future?" Government Executive, Vol. 6, No. 7, July 1974, pp. 35-37.

Official Documents

6. Aeronautical Systems Division. History of Aeronautical Systems Division, AFSC, July 1973 - June 1974, Vol. 1, K243.011, in USAF Collection, USAFHRC. SECRET-RESTRICTED DATA. Atomic Energy Act of 1954. Unclassified information only used from this source.

7. Aeronautical Systems Division. History of Aeronautical Systems Division, AFSC, January-December, 1976, Vol. 1, K243.011, in USAF Collection, USAFHRC. SECRET-RESTRICTED DATA. Atomic Energy Act of 1954. Unclassified information only used from this source.

8. Aeronautical Systems Division. History of Aeronautical Systems Division, AFSC, October 1978-September 1979, Vol. 1, K243.011, in USAF Collection, USAFHRC. SECRET-RESTRICTED DATA. Classified by HQ ASD. Unclassified information only used from this source.

9. Aeronautical Systems Division. History of Aeronautical Systems Division, AFSC, October 1981-September 1982, Vol. 1, K243.011, in USAF Collection, USAFHRC. SECRET-RESTRICTED DATA. Classified by HQ ASD. Unclassified information only used from this source.

10. Aeronautical Systems Division. History of Aeronautical Systems Division, AFSC, October 1982-December 1983, Vol. 1, K243.011, in USAF Collection, USAFHRC. SECRET. Unclassified information only used from this source.

11. Aeronautical Systems Division. History of Aeronautical Systems Division, AFSC, January-December 1984, Vol. 1, K243.011, in USAF Collection, USAFHRC. SECRET. Unclassified information only used from this source.

12. Aeronautical Systems Division. History of Aeronautical Systems Division, AFSC, January-December 1985, Vol. 1, K243.011, in USAF Collection, USAFHRC. SECRET. Unclassified information only used from this source.

13. Air Force Acquisition Logistics Division. History of Air Force Acquisition Logistics Division, AFLC, January-December, 1976, Vol. 1, K200.071, in USAF Collection, USAFHRC.

14. Air Force Acquisition Logistics Division. History of Air Air Force Acquisition Logistics Division, AFLC, January-December, 1977, Vol. 1, K200.071, in USAF Collection, USAFHRC.

15. Air Force Acquisition Logistics Division. History of the Air Force Acquisition Logistics Division, AFLC, January-December, 1978, Vol. 1, K200.071, in USAF Collection, USAFHRC.

16. Air Force Acquisition Logistics Division. History of the Air Force Acquisition Logistics Division, AFLC, October 1978-September 1979, Vol. 1, K200.071, in USAF Collection, USAFHRC.

17. Air Force Acquisition Logistics Division. History of the Air Force Acquisition Logistics Division, AFLC, October 1979-September 1980, Vol. 1, K200.071, in USAF Collection, USAFHRC.

18. Air Force Acquisition Logistics Division. History of the Air Force Acquisition Logistics Division, AFLC, October 1980-September 1981, Vol. 1, K200.071, in USAF Collection, USAFHRC.

19. Air Force Acquisition Logistics Division. History of the Air Force Acquisition Logistics Division, AFLC, October 1981-September 1982, Vol. 1, K200.071, in USAF Collection, USAFHRC.

20. Air Force Logistics Command. History of the Air Force Logistics Command, January-December, 1976, Vol. 4, K200.01, in USAF Collection, USAFHRC.

21. Air Force Logistics Command. History of the Air Force Logistics Command, January-December, 1978, Vol. 1, K200.01, in USAF Collection, USAFHRC.

22. Air Force Logistics Command. History of the Air Force Logistics Command, October 1978-September 1979, Vol. 1, K200.01, in USAF Collection, USAFHRC.

23. Air Force Logistics Command. History of the Air Force Logistics Command, October 1979-September 1980, Vol. 1, K200.01, in USAF Collection, USAFHRC.

24. Air Force Logistics Command. History of the Air Force Logistics Command, October 1980-September 1981, Vol. 1, K200.01, in USAF Collection, USAFHRC.

25. Air Force Logistics Command. History of the Air Force Logistics Command, October 1981-September 1982, Vol. 1, K200.01, in USAF Collection, USAFHRC. SECRET. Classified by Multiple Sources. Declassify on OADR. Unclassified information only used from this source.

26. Air Force Systems Command. AFSCP 800-3, A Guide for Program Management. Andrews AFB, DC: AFSC/SDD, 9 April 1976.

27. Air Force Systems Command. History of the Air Force Systems Command, October 1982-September 1983, Vol. 1, K243.01, in USAF Collection, USAFHRC. SECRET-RESTRICTED DATA. Classified by Multiple Sources. Unclassified information only used from this source.

28. Air Force Test and Evaluation Center. History of Air Force Test and Evaluation Center, 1 January-31 December 1979, Vols. 1 and 16. K150.01, in USAF Collection, USAFHRC. SECRET-NOFORN. Classified by Multiple Sources. Review 31 December 2009. Unclassified information only used from this source.

29. Air Force Test and Evaluation Center. History of Air Force Test and Evaluation Center, 1 January-31 December 1981, Vol. 1. K150.01, in USAF Collection, USAFHRC. SECRET. Classified by Multiple Sources. Review on 31 December 2111. Unclassified information only used from this source.

30. Air Force Test and Evaluation Center. "KC-10A Advanced Tanker/Cargo Aircraft Qualification Operational Test and Evaluation Test Plan." AFTEC Report 80-306, Kirtland AFB, NM, October 1979.

31. 8th Air Force. History of the 8th Air Force, 1 January-31 December, 1979, Vol. 1, K520.01, in USAF Collection, USAFHRC. SECRET. Unclassified information only used from this source.

32. 514th Military Airlift Wing. History of the 514th Military Airlift Wing, 1 January-31 March 1980, K-WG-514-HI, in USAF Collection, USAFHRC.

33. Military Airlift Command. History of the Military Airlift Command, January-December, 1978, Vol. 1, K300.01, in USAF Collection, USAFHRC.

34. 93rd Bomb Wing. History of the 93rd Bomb Wing, 1 January-31 March 1981, K-WG-93-HI, in USAF Collection, USAFHRC.

35. Strategic Air Command. History of the Strategic Air Command, January-June, 1968, Vol. 12, Ex. 24, Letter from HQ USAF/PO to HQ SAC/DO, K416.01-112, in USAF Collection, USAFHRC.

36. Strategic Air Command. History of the Strategic Air Command, July 1970-June 1971, Vol. 1, K416.01-119, TS-HOA-72-13, in USAF Collection, USAFHRC. TOP SECRET-RESTRICTED DATA. Classified by CINCSAC. Excluded from automatic degrading and declassification, DODD 5200.10 does not apply. Unclassified information only used from this source.

37. Strategic Air Command. History of the Strategic Air Command, July 1973-June 1974, Vol. 1, K416.01-142, TS-HOA-75-42, in USAF Collection, USAFHRC. TOP SECRET-RESTRICTED DATA. Classified by CINCSAC. Excluded from automatic degrading and declassification, DODD 5200.10 does not apply. Unclassified information only used from this source.

38. Strategic Air Command. History of the Strategic Air Command, July 1975-June 1976, Vol. 1, TS-HOA-77-56, in USAF Collection, USAFHRC. TOP SECRET-RESTRICTED DATA. Classified by CINCSAC. Excluded from automatic degrading and declassification, DODD 5200.10 does not apply. Unclassified information only used from this source.

39. Strategic Air Command. History of the Strategic Air Command, January-December 1977, Vol. 1, TS-HOA-78-214, in USAF Collection, USAFHRC. TOP SECRET-RESTRICTED DATA. Classified by CINCSAC. Unclassified information only used from this source.

40. Strategic Air Command. History of the Strategic Air Command, January-December 1978, Vol. 1, TS-HD-79-34, in USAF Collection, USAFHRC. TOP SECRET-RESTRICTED DATA. Classified by Multiple Sources. Unclassified information only used from this source.

41. Strategic Air Command. History of the Strategic Air Command, January-December 1981, Vol. 1, 83-TS-AFSHRC-3, in USAF Collection, USAFHRC. TOP SECRET-RESTRICTED DATA. Classified by Multiple Sources. UK Restricted. Unclassified information only used from this source.

42. Strategic Air Command. History of the Strategic Air Command, January-December 1982, Vol. 1, 84-TS-AFHRC-37, in USAF Collection, USAFHRC. TOP SECRET-RESTRICTED DATA. Classified by Multiple Sources. UK Restricted. Unclassified information only used from this source.

43. Strategic Air Command. History of the Strategic Air Command, January-December 1983, Vol. 1, 85-TS-AFHRC-1, in USAF Collection, USAFHRC. TOP SECRET-RESTRICTED DATA. Classified by Multiple Sources. UK Restricted. Unclassified information only used from this source.

44. Strategic Air Command. History of the Strategic Air Command, January-December 1985, Vol. 1, 86-TS-AFHRC-099, in USAF Collection, USAFHRC. TOP SECRET-RESTRICTED DATA. Classified by Multiple Sources. NOFORN. Unclassified information only used from this source.

45. Strategic Air Command. SAC Objectives Plan, 1968-1983 (U). Offutt AFB, NE: HQ SAC/DCS Plans, Directorate of Future Force Structure Studies and Evaluation, 22 August 1968, K416.164-2, TS-HOA-78-139, in USAF Collection, USAFHRC. TOP SECRET-RESTRICTED DATA. Classified by HQ SAC DCS/Plans. Group 1, excluded from automatic downgrading and declassification schedule. Unclassified information only used from this source.

46. 320th Bomb Wing. History of the 320th Bomb Wing. 1 January-31 March 1981, K-WG-320-HI, in USAF Collection, USAFHRC.

47. 3306 Test and Evaluation Squadron. History of the 3306 Test and Evaluation Squadron, January-June 1978, K-SQ-TEST-3306-HI, in USAF Collection, USAFHRC.

48. US Department of Defense. "Decision Coordinating Paper 148, KC-10 Advanced Tanker/Cargo Aircraft (ATCA)," 6 November 1978: Washington, DC. K168.024-12, in USAF Collection, USAFHRC. SECRET. Classified by HQ USAF/RD. Exempt from GDS of E.O. 11652, Exemption category 3. Declassify on 31 December 2006. Unclassified information only used from this source.

49. US Department of Defense. DODD 5000.1, Major and Non-Major Defense Acquisition Programs. Washington, DC: 1 September 1987.

50. US Department of Defense. DODI 5000.2, Defense Acquisition Program Procedures. Washington, DC: 1 September 1987.

51. US Department of the Air Force. "Air Force Report to the 95th Congress," March 1977: Washington, DC, K168.024-11, in USAF Collection, USAFHRC.

52. US Department of the Air Force, Assistant Chief of Staff for Studies and Analysis. "Large Convertible or Freighter Airlift Aircraft in a Tanker Role (SABER READINESS) (BRAVO))," 1 May 1972, K143.44-60, in USAF Collection, USAFHRC.

53. US Department of the Air Force, History of the Assistant Chief of Staff for Studies and Analysis. 1 January-30 June 1979, K143.011, in USAF Collection, USAFHRC.

54. US Department of the Air Force. "Chief of Staff Posture Statement, FY 1970," 8 January 1969, K168.03-2, in USAF Collection, USAFHRC.

55. US Department of the Air Force. "Chief of Staff Report to the 95th Congress," 10 February 1977: Washington, DC, K200.071, Ex. 108, in USAF Collection, USAFHRC.

56. US Department of the Air Force, Deputy Chief of Staff for Plans and Operations. A History of Strategic Arms Competition, 1945-1972, Vol. 5, Selected Chronologies. June 1976, K143.52-6, in USAF Collection, USAFHRC. SECRET. Classified by HQ USAF/DCS/Plans. Exempt from GDS, Category 2, Delassify on 31 December 2005. Unclassified information only used from this source.

57. US Department of the Air Force. History of the United States Air Force, DCS Research & Development, July-December 1967, Vol. 4, K140.01, in USAF Collection, USAFHRC. SECRET-RESTRICTED DATA. NOFORN. Classified by HQ USAF DCS/R&D. Unclassified information only used from this source.

58. US Department of the Air Force. History of the United States Air Force, DCS Research & Development, July-December 1968, Vol. 4, K140.01, in USAF Collection, USAFHRC. SECRET-RESTRICTED DATA. NOFORN. Classified by HQ USAF DCS/R&D. Unclassified information only used from this source.

59. US Department of the Air Force. History of the United States Air Force, DCS Research & Development, January-June 1969, Vol. 2, K140.01, in USAF Collection, USAFHRC. SECRET-RESTRICTED DATA. NOFORN. Classified by HQ USAF DCS/R&D. Unclassified information only used from this source.

60. US Department of the Air Force. History of the United States Air Force, DCS Research & Development, July-December 1969, Vol. 4, K140.01, in USAF Collection, USAFHRC. SECRET-RESTRICTED DATA. NOFORN. Classified by HQ USAF DCS/R&D. Unclassified information only used from this source.

61. US Department of the Air Force. History of the United States Air Force, DCS Research & Development, January-June 1970, Vol. 2, K140.01, in USAF Collection, USAFHRC. SECRET-RESTRICTED DATA. NOFORN. Classified by HQ USAF DCS/R&D. Unclassified information only used from this source.

62. US Department of the Air Force. History of the United States Air Force, DCS Research & Development, July-December 1970, Vol. 4, K140.01, in USAF Collection, USAFHRC. SECRET-RESTRICTED DATA. NORFORN. Classified by HQ USAF DCS/R&D. Unclassified information only used from this source.

63. US Department of the Air Force. History of the United States Air Force, DCS Research & Development, January-June 1971, Vol. 2, K140.01, in USAF Collection, USAFHRC. SECRET-RESTRICTED DATA. NORFORN. Classified by HQ USAF DCS/R&D. Unclassified information only used from this source.

64. US Department of the Air Force. History of the United States Air Force, DCS Research & Development, July-December 1971, Vol. 2, K140.01, in USAF Collection, USAFHRC. SECRET-RESTRICTED DATA. NORFORN. Classified by HQ USAF DCS/R&D. Unclassified information only used from this source.

65. US Department of the Air Force. History of the United States Air Force, DCS Research & Development, January-June 1972, Vol. 2, K140.01, in USAF Collection, USAFHRC. SECRET-RESTRICTED DATA. NOFORN. Classified by HQ USAF DCS/R&D. Exempt from GDS of EO 11652, Category 2, Declassification date: Indefinite. Unclassified information only used from this source.

66. US Department of the Air Force. History of the United States Air Force, DCS Research & Development, July-December 1972, Vol. 1, K140.01, in USAF Collection, USAFHRC. SECRET-RESTRICTED DATA. NOFORN. Classified by HQ USAF DCS/R&D. Exempt from GDS of EO 11652, Category 2, Declassification date: Indefinite. Unclassified information only used from this source.

67. US Department of the Air Force. History of the United States Air Force, DCS Research & Development, January-June 1973, Vol, 3, K140.01, in USAF Collection, USAFHRC. SECRET-RESTRICTED DATA. Classified by HQ USAF DCS/R&D. Exempt from GDS of EO 11652, Categories 2 and 3. Declassification date: Indefinite. Unclassified information only used from this source.

68. US Department of the Air Force. History of the United States Air Force, DCS Research & Development, July-December 1973, Vol. 3, K140.01, in USAF Collection, USAFHRC. SECRET-RESTRICTED DATA. Classified by HQ USAF DCS/R&D. Exempt from GDS of EO 11652, Categories 2 and 3. Declassification date: Indefinite. Unclassified information only used from this source.

69. US Department of the Air Force. History of the United States Air Force, DCS Research & Development, January-June 1974, Vol. 3, K140.01, in USAF Collection, USAFHRC. SECRET-RESTRICTED DATA. Classified by HQ USAF DCS/R&D. Exempt from GDS of EO 11652, Categories 2 and 3. Declassification date: Indefinite. Unclassified information only used from this source.

70. US Department of the Air Force. History of the United States Air Force, DCS Research & Development, July-December 1974, Vol. 3, K140.01, in USAF Collection, USAFHRC. SECRET-RESTRICTED DATA. Classified by HQ USAF DCS/R&D. Exempt from GDS of EO 11652, Categories 2 and 3. Declassification date: Indefinite. Unclassified information only used from this source.

71. US Department of the Air Force. History of the United States Air Force, DCS Research & Development, January-June 1975, Vol. 3, K140.01, in USAF Collection, USAFHRC. SECRET-RESTRICTED DATA. Classified by Misc. Authorities. Exempt from GDS of EO 11652, Categories 2 and 3. Declassification date: Indefinite. Unclassified information only used from this source.

72. US Department of the Air Force. History of the United States Air Force, DCS Research & Development, July-December 1975, Vol. 3, K140.01, in USAF Collection, USAFHRC. SECRET-RESTRICTED DATA. Classified by Misc. Authorities. Exempt from GDS of EO 11652, Categories 2 and 3. Declassify Upon Notification of Originator. Unclassified information only used from this source.

73. US Department of the Air Force. History of the United States Air Force, DCS Research & Development, January-June 1976, Vol. 3, K140.01, in USAF Collection, USAFHRC. SECRET-RESTRICTED DATA. Classified by ERDA Security Classification Guide. Unclassified information only used from this source.

74. US Department of the Air Force. History of the United States Air Force, DCS Research & Development, July-December 1976, Vol. 3, K140.01, in USAF Collection, USAFHRC. SECRET-RESTRICTED DATA. Classified by ERDA/DOD Security Classification Guide. Unclassified information only used from this source.

75. US Department of the Air Force. History of the United States Air Force, DCS Research & Development, January-June 1977, Vol. 5, K140.01, in USAF Collection, USAFHRC. SECRET-RESTRICTED DATA. Classified by ERDA Security Classification Guide. Unclassified information only used from this source.

76. US Department of the Air Force. History of the United States Air Force, DCS Research & Development, July-December 1977, Vol. 1, K140.01, in USAF Collection, USAFHRC. SECRET-RESTRICTED DATA. Classified by HQ USAF/RDQ. Unclassified information only used from this source.

77. US Department of the Air Force. History of the United States Air Force, DCS Research & Development, January-June 1978, Vol. 3, K140.01, in USAF Collection, USAFHRC. SECRET-RESTRICTED DATA. Classified by HQ USAF/RDQ. Unclassified information only used from this source.

78. US Department of the Air Force. History of the United States Air Force, DCS Research & Development, July-December 1978, Vol. 5, K140.01, in USAF Collection, USAFHRC. SECRET-RESTRICTED DATA. Classified by HQ USAF/RDQ. Unclassified information only used from this source.

79. US Department of the Air Force. History of the United States Air Force, DCS Research & Development, January-June 1979, Vol. 5, K140.01, in USAF Collection, USAFHRC. SECRET-RESTRICTED DATA. Classified by HQ USAF/RDQ. Unclassified information only used from this source.

80. US Government, Executive Office of the President, Office of Management and Budget. Major System Acquisitions, Circular A-109. Washington, DC, 5 April 1976.

81. US House of Representatives, Report by the Research and Development Subcommittee of the Committee on Armed Services. The Posture of Military Airlift. Washington, DC: Government Printing Office, 1976.

Unpublished Materials

82. Background Paper for AF Chief of Staff, "Importance of Air Refueling to Strategic Airlift," 16 July 1974, 168.7100-567, Atch. 6-3, 16-17 July 1974, in Papers of General P.K. Carlton, USAFHRC. SECRET. Classified by USAFSS, Comfy Bright. Exempt from GDS of EO 11652, Category 3. Declassify on 31 December 2002. Unclassified information only used from this source.

83. Background Paper for Honorable C. Melvin Price, "Advanced Tanker/Cargo Aircraft (ATCA)," 31 August 1975. 168.7100-346, in Papers of General P.K. Carlton, USAFHRC.

84. Background Paper for Presidential Transition Team. "Acquisition of Advanced Tanker/Cargo Aircraft (ATCA)." In Papers of Air Force Directorate of Plans/Air Force Participation in Presidential Transition, 2 November 1976-25 March 1977, Volume 6, Part 2, 143.043, USAFHRC.

85. Background Paper for Secretary of the Air Force, Mr. Reed, "Advanced Tanker/Cargo Aircraft," 13 January 1976. 168.7100-382, in papers of General P.K. Carlton, USAFHRC.

86. Briefing Topics for use by AF/CC during his initial meeting with the President-Elect, 3 December 1976. In Papers of Air Force Directorate of Plans/Air Force Participation in Presidential Transition, 2 November 1976 - 25 March 1977, Vol. 6, Part 2, 143.043, USAFHRC.

87. Butschek, Robert J. and Gregorios, Basil D. "Air Refueling Support: Global Air Refueling Requirements--Can They Be Met?" Research Report 21, prepared at Air War College, Air University, Maxwell AFB, AL, 1977. K239.042-21A, 1 April 1977, in USAF Collection, USAFHRC. SECRET. Classified by various authorities. Exempt from GDS of E.O. 11652. Exemption Category 2. Review 30 April 1997. Unclassified information only used from this source.

88. Carlton, Paul K., General, USAF. "End of Tour Report." Letter to AF Chief of Staff, 30 March 1977, 300.131, in End of Tour Report Collection, USAFHRC.

89. Carlton, Paul K., General, USAF. "Military Airlift." Presentation to the Committee on Appropriations, United States Senate, June 1976. 168.7100-346, June 1976, in Papers of General P.K. Carlton, USAFHRC.

90. Eastman, David B. Manager, Media Relations, Government Programs, Douglas Aircraft Company, McDonnell Douglas Corporation, Long Beach, CA. Telecon, 3 February 1988.

91. Ellis, Jeffrey T., and Rougeau, Joseph M. "Acquisition Management Handbook." Research study prepared at the Air Command and Staff College, Air University, Maxwell AFB, AL, 1976.

92. Foley, Jack O. "The KC-10--Concept, Capabilities, and Future." Research report prepared at the Air War College, Air University, Maxwell AFB, AL, 1984.

93. Huffman, James W.; Lozito, Jr., Vincent J.; and Snyder, Larry A. "Weapon Systems Acquisition Guide." Research study prepared at the Air Command and Staff College, Air University, Maxwell AFB, AL, 1981.

94. McDonnell Douglas Corporation. "USAF/McDonnell Douglas KC-10A Advanced Tanker/Cargo Aircraft Background Information." Long Beach, CA, September 1987.

95. Memorandum Regarding ATCA Briefing, 15 December 1976. In Papers of Air Force Directorate of Plans/Air Force Participation in Presidential Transition, 2 November 1976-25 March 1977, Vol. 4, Ex. 7, 143.043-21, USAFHRC.

96. Memorandum Regarding ATCA Status, 22 April 1977. In History of AFALD, January-December 1977, K200.071, Ex. 114, in USAFHRC.

97. Newill, Curtis N. III. "KC-10--A Study in Commercial Derivative Aircraft Acquisition." Research study prepared at the Air Command and Staff College, Air University, Maxwell AFB, AL, 1980.

98. Newill, Curtis N. III, Lieutenant Colonel, USAF. Chief, Logistics Contracting, Systems & Logistics Contracting Division, Directorate of Contracting and Manufacturing Policy, Office of the Assistant Secretary of the Air Force (Acquisition), Washington, DC. Telecon, 29 January 1988.

99. Polk, Douglas, Lieutenant Colonel, USAF. KC-10A System Manager, Directorate of Materiel Management, Oklahoma City Air Logistics Center, Tinker AFB, OK. Telecon, 1 February 1988.

100. US Department of Defense, Office of the Director, Planning and Evaluation. Memorandum for the Director, Defense Research and Engineering, "Advanced Tanker Cargo Aircraft (ATCA) DPC," 14 October 1976. 168.7100-669, in Papers of General P.K. Carlton, USAFHRC.

101. US Department of the Air Force, Office of the Chief of Staff. Memorandum for the Chairman of the Joint Chiefs of Staff, "Advanced Tanker/Cargo Aircraft (ATCA)," October 1976. 168.7100-669, in Papers of General P.K. Carlton, USAFHRC.